

سلسلة كتب الأستاذ

SCIENCE

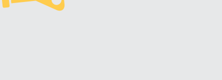
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First Term

5th Primary



Contents

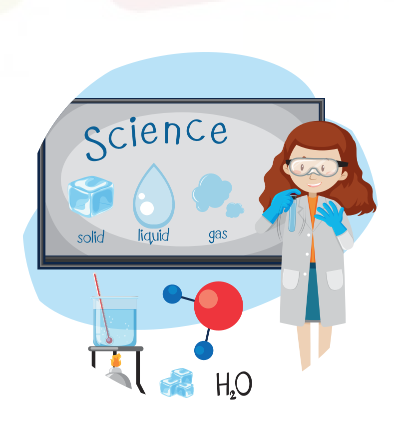


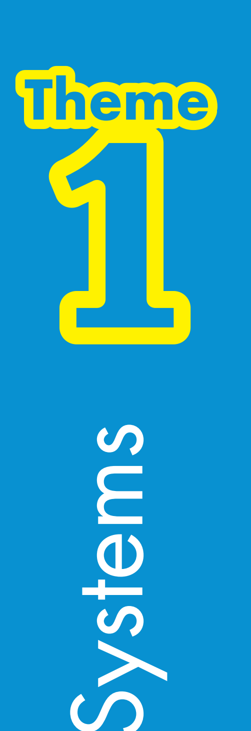
Theme 1: Systems

Unit 1 Interactions of Organisms

Theme 2: Matter and Energy

Unit 2 Particles in Motion









Interactions of Organisms

Unit Concepts:

- Concept 1 Plant Needs
- Concept 2 Energy Flow in Ecosystems
- Concept 3 Changes in Food Webs
- Unit Project: Build a Miniature Ecosystem

Unit Objectives

In this unit, we will study:

1. Plant structures and needs.
2. The photosynthesis process.
3. Plant transport system and human circulatory system.
4. How energy transfers through food chains and food webs.
5. Effects of pollution on food chains and food webs in ecosystems.

Get Started
What I Already Know





Plant Needs:

1. Plants are found everywhere around us.
2. A plant consists of roots, stem, leaves, and sometimes flowers or fruits.

» What do you think the plants need to grow healthy?

• Plants need sunlight, water, air, and soil to grow healthy.	
• Plants withdraw (die) in the absence of sunlight, water or air.	

« احتياجات النبات:

- توجد النباتات في كل مكان حولنا.
- يتكون النبات من الجذور والساق والأوراق وأحيانًا تنبت الزهور أو الثمار.

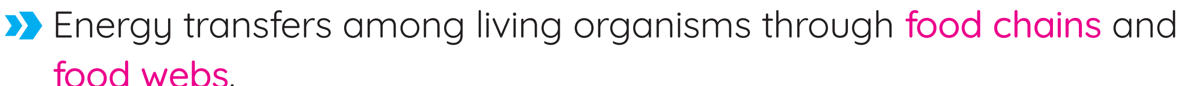
« برأيك ماذا يحتاج النبات لينمو بشكل صحي؟

– يحتاج النبات لضوء الشمس والماء والهواء والتربة لينمو بشكل صحي.
– يذبل النبات أو يموت في حالة عدم توافر ضوء الشمس أو الماء أو الهواء.

Food Chains and Food Webs:



» A squirrel needs energy to survive.
» The squirrel eats a variety of foods: leaves, fruits, insects, and bird chicks.
» Larger animals eat squirrels to get their needs of energy.



» Energy transfers among living organisms through food chains and food webs.

« السلاسل الغذائية والشبكات الغذائية:

- يحتاج السنجاب إلى الطاقة للبقاء.
- يتناول السنجاب مجموعة متنوعة من الغذاء مثل الأوراق، والفواكه، والحشرات وصغار الطيور.
- تأكل الحيوانات الأكبر حجمًا السناجب للحصول على احتياجاتها من الطاقة.
- تنتقل الطاقة من كائن حي لآخر عن طريق السلاسل الغذائية والشبكات الغذائية.



Concept 1

Plant Needs

Concept Objectives:

By the end of this concept, students will be able to:

- Understand that plants use specialized structures to obtain the materials that they need to grow from sunlight, air, and water.
- Develop a model of how energy moves through plants.
- Develop a model of plant processes that use natural resources to complete life processes.
- Compare the structure and function of the transport system in plants with the circulatory system in humans.

Key Vocabulary:

- Arteries
- Veins
- Circulatory system
- Digestive system
- Dispersal
- Germinate
- Glucose
- Nutrients
- Phloem
- Photosynthesis
- Plant
- Stem
- Stomata
- Survive
- System
- Xylem

Concept 1

Plant Needs

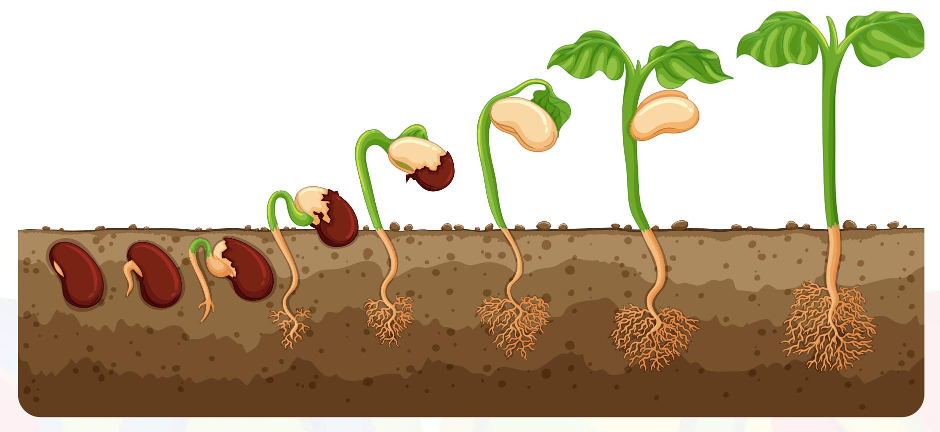
Lesson 1



Activity 1 Can You Explain?



1. A plant is a living organism, like a human being, that goes through different stages of growth.
2. A plant needs water, air, sunlight and space to grow.



• النبات كائن حي كالإنسان يمر بمراحل نمو مختلفة. • يحتاج النبات إلى (الماء، الهواء، ضوء الشمس، المساحة الكافية) للنمو.

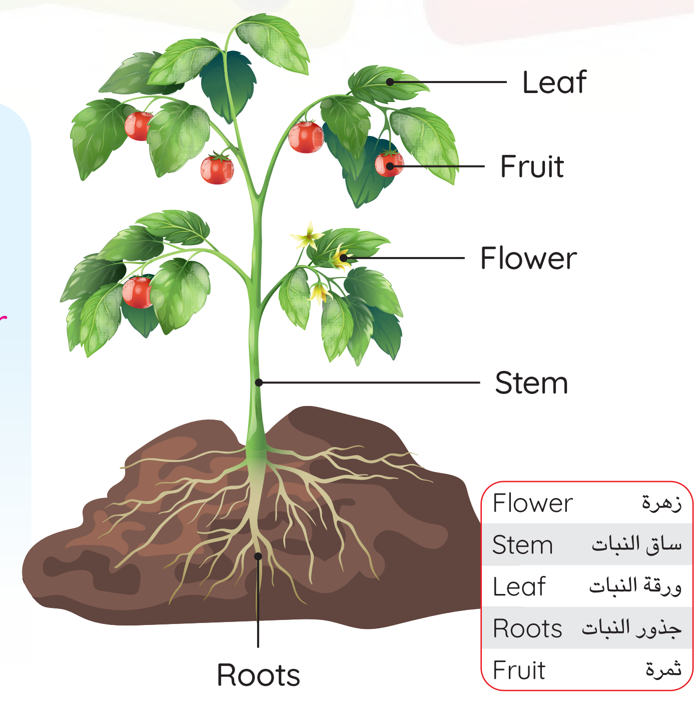


How do the structures of a plant use water, air, and light to survive?

Plant Structure

- A plant consists of roots, stems, leaves, and sometimes flowers or fruits.
  - A plant's roots absorb water and nutrients from the soil.
  - The other structures of the plant help it to survive.

Nutrients	عناصر غذائية
Soil	التربة
Survive	ينجو



Flower	زهرة
Stem	ساق النبات
Leaf	ورقة النبات
Roots	جذور النبات
Fruit	ثمرة



Activity 2 Tree Needs





What do humans and plants need to grow and survive



Humans

» Our bodies need food and water every day to be healthy, grow, and survive.



• يحتاج جسم الإنسان إلى الماء والغذاء يوميًّا؛ ليظل سليمًا صحيًّا وينمو ويبقى على قيد الحياة.

Plants

» Plants use natural resources, such as sunlight, water and air to make their own food.

» When we plant a tree, we notice over time that it grows and turns from a seedling into a mature tree.



• النباتات تستخدم الموارد الطبيعية مثل ضوء الشمس والماء والهواء لتصنيع غذائها، فعندما نقوم بزراعة شجرة، نلاحظ بمرور الوقت أنها تنمو وتتحول من شتلة إلى شجرة كبيرة.

To grow a healthy plant, we need:

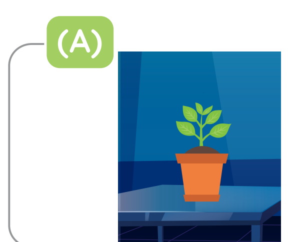
Sunlight	Water and air	Soil	Space to grow
			

Check your understanding?

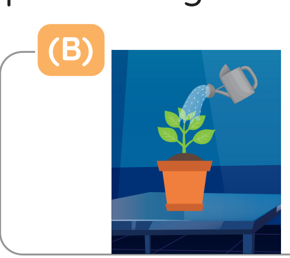


» Which of the following plants will grow healthy?

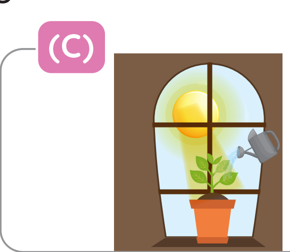
(A)



(B)



(C)







Activity 3 What Do You Already Know About Plant Needs?

- All living organisms have basic needs to survive.
- Some needs of plants and animals are very similar, while others are very different.

Plants	Animals
	

1 Their needs

Plants

- To survive, plants need:
  1. Sunlight
  2. Water
  3. Air
  4. Nutrients (عناصر غذائية)

Animals

- To survive, animals need:
  1. Food
  2. Water
  3. Air
  4. Shelter (المأوى)

2 How they get their food

- Plants can make their own food (sugar) in their leaves through the photosynthesis process.
- Most animals move to search for food.



Important Note:

- Both animals and plants have similar needs for air and water.
- يتشابه كل من الحيوانات والنباتات في احتياجها للهواء والماء.

Plant Needs

Classify the following words in the table below:

Carbon dioxide gas – Sugar – Oxygen gas – Forest – Water – Sunlight – Soil

Basic plant needs for photosynthesis	Not basic plant needs for photosynthesis
....	....
....	....

Give a reason for...

- Soil isn't included as a basic plant need.

Because some plants don't need soil to grow, such as:

Plants that grow in water



نباتات تنمو في الماء

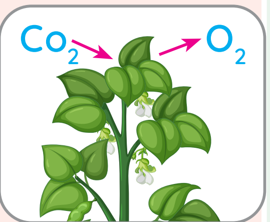
Plants that grow on other plants



نباتات تنمو على النباتات الأخرى

Misconceptions about plants needs

Plants, like humans and animals, need oxygen gas only. ✗



Plants need carbon dioxide gas during the photosynthesis process, while they need oxygen gas during the respiration process. ✓

• يعتقد البعض أن النبات مثل الإنسان والحيوان يحتاج إلى غاز الأكسجين فقط، ولكن تحتاج النباتات إلى غاز ثاني أكسيد الكربون للقيام بعملية البناء الضوئي وغاز الأكسجين أثناء عملية التنفس.

Ways of Getting Energy

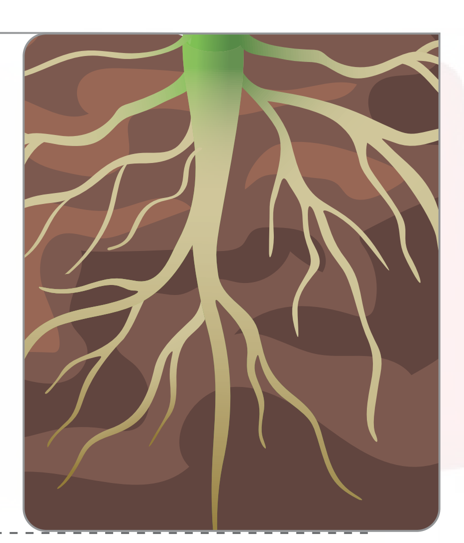
1 Humans and animals:



- Humans and animals need to eat food to gain nutrients and energy to live and grow.

• يحتاج البشر والحيوانات الغذاء للحصول على العناصر الغذائية والطاقة اللازمة للبقاء والنمو.

2 Plants:



Plants' Roots and Stem

- Plants' roots absorb water and nutrients from the soil, and then they pass from the roots to the leaves through the stem.

• تمتص جذور النباتات الماء والعناصر الغذائية من التربة، ثم تنتقل من الجذور إلى الأوراق عبر الساق.

Plants' Leaves



- Plants make their own food in their leaves through the photosynthesis process.
- Plants' food is a kind of sugar that provides them with the energy needed for growth.

• تصنع النباتات غذاءها في أوراقها من خلال عملية البناء الضوئي.
• غذاء النبات هو نوع من السكر الذي يمدها بالطاقة اللازمة للنمو.

Exercises on Lesson 1

1 Choose the correct answer:

1. All the following structures exist in green plants, except ....
   a. stems b. fruits c. muscles d. leaves
2. Both plants and humans need .... to survive.
   a. a shelter b. a forest c. a soil d. air
3. Green plants can absorb .... from the soil.
   a. oxygen b. nutrients c. air d. food
4. In the absence of ...., plants will die.
   a. shelter b. food c. soil d. sunlight
5. If you are walking in a garden, you can observe all the plant parts, except the ....
   a. leaves b. stems c. roots d. flowers
6. Green plants can make their own food through the .... process.
   a. respiration b. digestion c. photosynthesis d. thinking
7. Manufacturing of the plant food takes place inside .... of the plant.
   a. the leaves b. the roots c. the stem d. all parts
8. Green plants and animals are similar in ....
   a. size b. structure c. growth d. movement
9. .... and .... are some of the basic needs of all living organisms.
   a. Soil – air b. Water – soil
   c. Air – water d. Sunlight – shelter
10. Animals need all the following things to grow and survive, except ....
    a. water b. soil c. shelter d. food
11. Green plants can survive and grow without ....
    a. water b. the Sun c. air d. soil
12. The .... of the plant helps in the transmission of nutrients and water to the plant leaves.
    a. stem b. root c. flower d. fruit
13. .... can use sunlight to produce their own food.
    a. Foxes b. Humans c. Trees d. Insects

14 The main function of roots is ....

a. absorbing sunlight
b. producing sugar
c. absorbing carbon dioxide gas
d. absorbing water and nutrients

2 Put (✓) or (✗):

1. All living organisms need water and air to survive. ( )
2. Plants can get their food from the soil through the roots. ( )
3. All different structures of plants help them survive. ( )
4. Unlike plants, animals can't make their own food by themselves. ( )
5. Each part of the plant has a specific function. ( )
6. Photosynthesis process takes place in all plant parts. ( )
7. The stem transports water and nutrients from the soil to the plant's leaves. ( )
8. Without the soil, plants can't grow even if they obtain water and sunlight. ( )
9. There are some plants that can grow easily on other plants. ( )
10. The photosynthesis process is a vital process that enables green plants to get the needed energy to grow healthy. ( )

3 Write the scientific term:

1. They are living organisms that can make their own food. (........................)
2. The vital process by which plants can make their own food. (........................)
3. A part of a plant that absorbs water and nutrients from the soil. (........................)
4. A part of a plant that is responsible for manufacturing its food. (........................)
5. A part of a plant that transports water and nutrients from the roots to the leaves. (........................)
6. A gas that a plant needs to make its own food. (........................)
7. A gas that a plant needs to respire. (........................)
8. The source of energy that a plant needs to manufacture its own food. (........................)

4 Complete the following sentence:

.................., ... and .... are the main common structures of plants.

5 Cross out the odd word:

1. Carbon dioxide gas – Shelter – Water – Sunlight (..................)
2. Roots – Oxygen gas – Leaves – Fruits (..................)

6 Classify the following words in the tables below:

1. Soil – Oxygen gas – Carbon dioxide gas – Sugar – Sunlight – Water

Basic plant needs to make its own food	Not basic plant needs to make its own food
....	....
....	....
....	....

2. Soil – Water – Air – Shelter – Sunlight

Plants Needs	Animals Needs	Animals and Plants Needs
....	....	....

7 Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1. Plants	a. are responsible for making the food of a plant.
2. Animals	b. absorb nutrients and water from the soil.
3. Roots	c. must move to get their food.
4. Leaves	d. can make their food by themselves.

1 .... 2 .... 3 .... 4 ....

Unit 1

8 Study the following figure, then answer the questions:

1 **Label the following:**

a ....

b ....

c ....

d ....

e ....

a
b
c
d
e

2 **Which part of the plant is responsible for:**

a Absorption of nutrients: ....

b Manufacturing of food: ....

c Transmission of nutrients: ....

3 Mention the most basic needs of a plant: ....

9 Give reasons for:

1 Plants' roots have great functions.

....

2 Plants and animals are different in the way of getting their energy.

....

3 Soil isn't included as a basic plant need.

....

10 What happens if:

A plant isn't exposed to sunlight for many days?

....

Lesson 2



Activity 4 Do Plants Need Soil?



Experiment

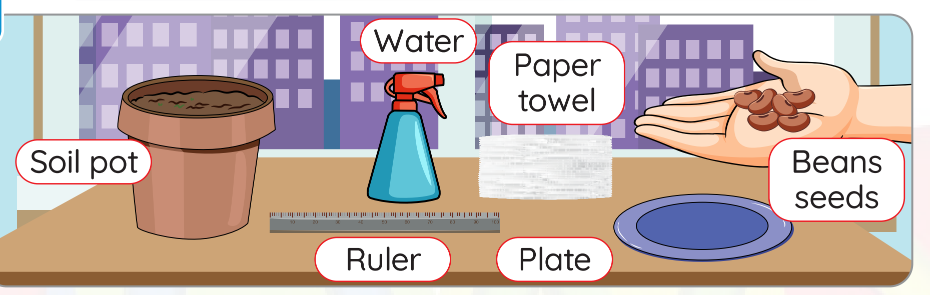
In this activity, we will germinate seeds in and out of the soil.

Germination The moment in a plant's life cycle when it sprouts and begins to grow from a seed.

هي لحظة في دورة حياة النبات عندما ينبت ويبدأ في النمو من البذرة.

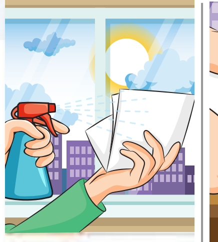


Tools:

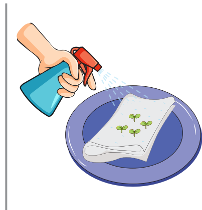


Steps:

A Germination of seeds in a paper towel







1. Place three bean seeds on the top half of a wet paper towel. Then, fold the bottom half of the towel up so that it covers the seeds.

B Germination of seeds in the soil



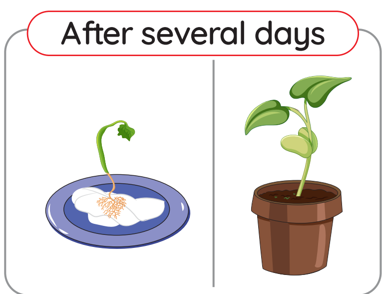


2. Plant another three bean seeds in the soil pot.

3. Place them in a place where they can get sunlight and water them.
4. Check the growth of the seeds using a ruler over the next several days.

Beans seeds	بذور فول
Germination	عملية الإنبات
Paper towels	مناديل ورقية
Soil pot	أصيص به تربه

Observations:



- The initial growth of the seeds placed in the paper towel is similar to that of the seeds planted in the soil.
- The rate of growth of the seeds that grow in the paper towel is slower than the seeds planted in the soil.

- مراحل النمو الأولى للبذور في المنشفة الورقية تتشابه مع مراحل النمو الأولى للبذور في التربة.
- البذور المزروعة في المنشفة الورقية تنمو بشكل أبطأ من البذور المزروعة في التربة.



Note:

- The seed is actually a miniature plant waiting to grow.

Conclusions:

- Soil is not one of the basic needs of a plant.
- Plants can grow without soil for a while if they have water and sunlight, but after that they will need either soil or an alternative system, such as:

Hydroponic system

It's a system full of water that contains important minerals and elements for the plant to grow.



- التربة ليست من الاحتياجات الأساسية للنبات.
- يمكن للنباتات أن تنمو بدون تربة لفترة من الوقت إذا كان لديها الماء وضوء الشمس، لكنها في النهاية ستحتاج إما إلى التربة أو إلى نظام بديل مثل:

نظام الزراعة المائية هو نظام مائي يوفر المعادن والعناصر الأساسية اللازمة لنمو النبات .



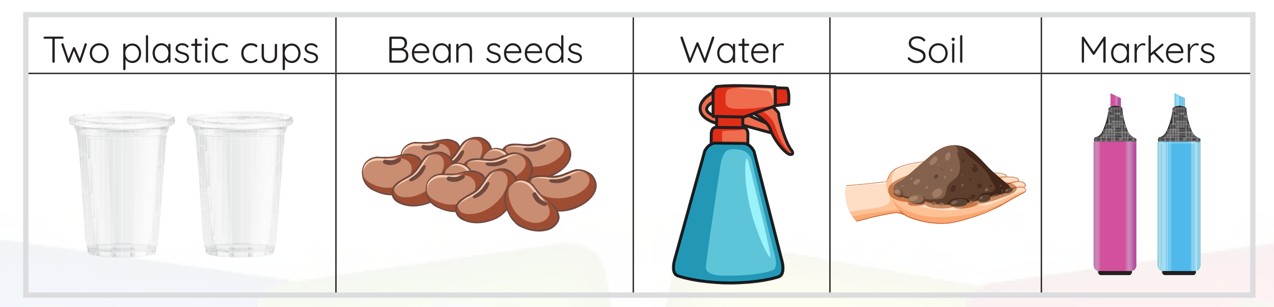

Activity 5 Sunlight: A Basic Need

Experiment

In this activity, you will study the effect of sunlight on plant growth.

• في هذا النشاط، ستقوم بدراسة تأثير ضوء الشمس على نمو النبات.

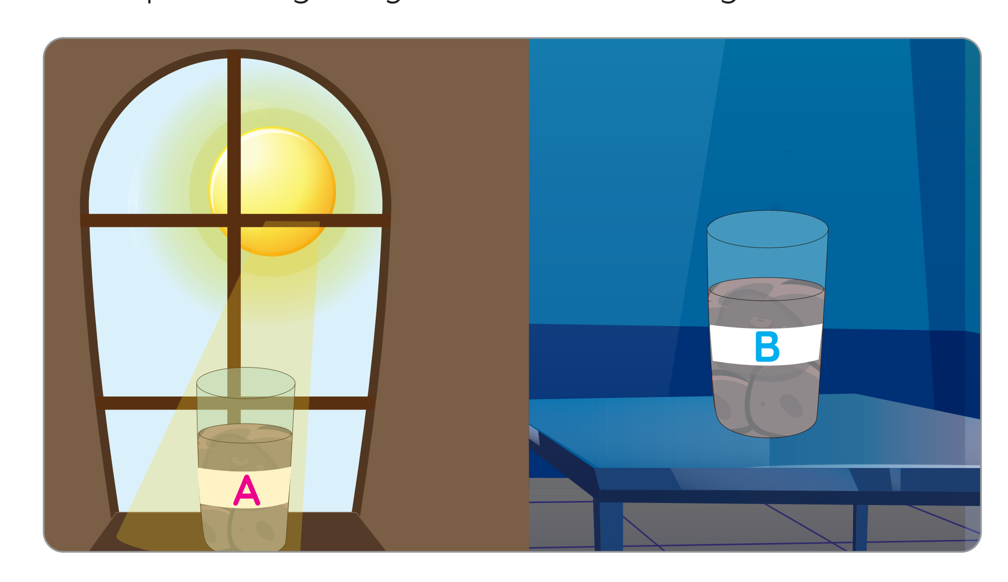
Tools:



Two plastic cups	Bean seeds	Water	Soil	Markers

Steps:

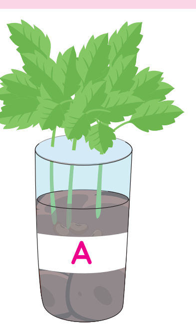
1. Add soil to the two cups, then label them "**Cup A**" and "**Cup B**".
2. Place one bean seed on the soil of each cup and cover it with 2 centimeters of soil.
3. Pour the same amount of water to each cup to moisten the soil.
4. Place **cup A** where it will receive light, and place **cup B** in the darkness.
5. Water both plants regularly and observe their growth for several days.



Observations: (After many days)

Plant in Cup (A)

Placed in the sunlight



It grows healthy and becomes strong:

- It grows with a tall stem.
- It has more leaves with a dark green color.

Plant in Cup (B)

Placed in the darkness



It grows unhealthy and becomes weak:

- It grows with a short stem.
- It has less leaves with a pale green color.

Conclusions:

» Sunlight is considered a basic need for a plant to survive. **G.R**
Because the plant uses sunlight to make its own food.

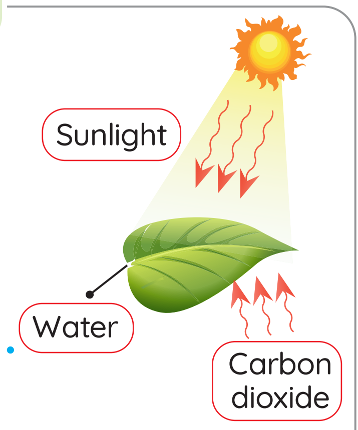


» The plant placed in the dark hardly grew (grew unhealthy). **G.R**
Because it had less food.

During photosynthesis

» Sunlight makes it possible for the water and carbon dioxide gas to combine to produce glucose, which gives the plant the energy it needs to grow healthy.

• أثناء عملية البناء الضوئي يتحد الماء مع ثاني أكسيد الكربون في وجود ضوء الشمس لإنتاج الجلوكوز الذي يمد النبات بالطاقة اللازمة للنمو بشكل صحي.



Exercises on Lesson 2

1 Choose the correct answer:

1. .... is the moment when a plant sprouts and begins to grow from a seed.
   a. Photosynthesis b. Respiration
   c. Germination d. Transpiration
2. Seeds can't grow in ....
   a. soil b. a wet paper towel
   c. water d. a dry paper towel
3. The hydroponic system contains .... and ....
   a. water – rocks b. minerals – wood
   c. minerals – water d. sand – nutrients
4. .... is not listed among the basic plant needs.
   a. Water b. Soil c. Air d. Sunlight
5. The rate of growth of the seeds that grow in a wet paper towel is .... the seeds that grow in the soil.
   a. slower than b. faster than
   c. similar to d. no correct answer
6. The plant that is placed in a dark room for days will have ....
   a. more leaves b. a taller stem
   c. pale leaves d. green leaves
7. All these materials are necessary for a plant to make its food, except ....
   a. sunlight b. oxygen gas
   c. water d. carbon dioxide gas

2 Put (✓) or (✗):

1. A plant can grow from a seed in a dry paper towel. ( )
2. At night, plants use moonlight to make photosynthesis process. ( )
3. The rate of initial growth in the soil and a dry paper towel is similar. ( )
4. All seeds need water and soil in their initial growth. ( )

5 Soil is not included as a basic plant need. ( )

6 The hydroponic system is an alternative growing medium for plants. ( )

7 The plant grows in the soil faster than in the wet paper towel. ( )

8 The plant that is left in the darkness has healthy green leaves. ( )

9 Sunlight is very necessary for a plant to survive. ( )

10 All nonliving things have basic needs to survive. ( )

3 Write the scientific term:

1 It's the process when a plant sprouts and begins to grow from a seed. (..................)

2 It's the process that helps a green plant get the needed energy. (..................)

3 It's a system full of water and important minerals for the plant to grow. (..................)

4 It's a liquid that the plant needs to grow and survive. (..................)

4 Complete the following sentences:

1 The growth of the seeds planted in paper towels is .... those planted in the soil.

2 The stem of a plant that is placed in the light is .... than that of a plan that is placed in a dark room.

3 In the absence of ...., the leaf of the plant will lose its green color.

5 Study the following figure, and then complete the sentences below:

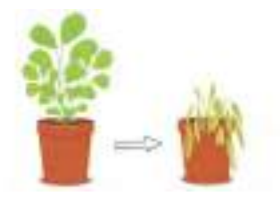
1 This figure represents the .... process.

2 The plant can get .... and .... from the soil.

3 The .... system can be used instead of the soil.

6 Adam traveled with his family for a week, but he left this plant in a dark room.

Adam observed that:



a. The number of leaves ....

(increased – decreased)



b. The leaves lost their .... color. (green – yellow)

7 Give reasons for:

1. Seeds can't grow in a dry paper towel.

....

2. Sometimes plants don't need the soil in their initial growth.

....

3. Sunlight is considered a basic need for plants.

....

8 What happens if:

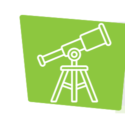
1. We put some bean seeds in a wet paper towel and others in the soil?

....

2. We leave a green plant in a dark room for many days?

....

Lesson 3



Activity  6 Parts of a Plant

Unit 1

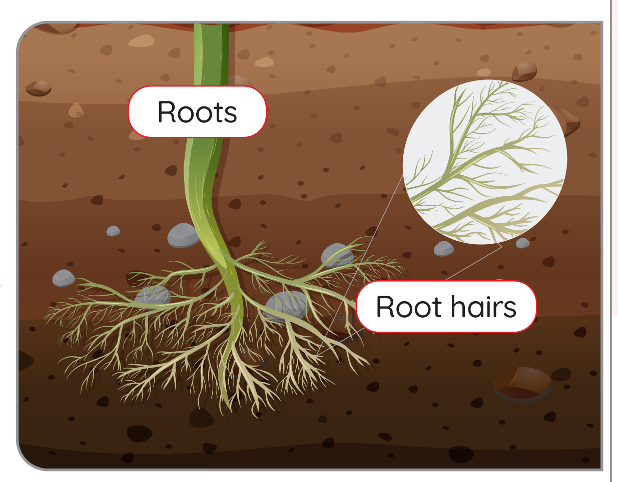
Parts of a Plant

- Even though all plants look different, they have similar parts.
- Each part of the plant does a specific function.

1 Plant's roots:

Plant's roots functions:

1. They fix (anchor) the plant in the soil.
2. They absorb (draw) water and nutrients from the soil and carry them to the plant to make the plant's food.



وظيفة الجذور:

1. تثبيت النبات في التربة.
2. مسئولة عن امتصاص الماء والعناصر الغذائية اللازمة من التربة ونقلها للنبات لصنع الغذاء.

- Plant roots have hair-like features called "root hairs".

Roots' hairs function:

- They increase the amount of water and nutrients that the plant can take in.

الشعيرات الجذرية: زوائد تشبه الشعر تمتد من الطبقة الخارجية للجذور.

وظيفتها: تزيد من كمية الماء والعناصر الغذائية التي يمتصها النبات.

2 Plant's stem:

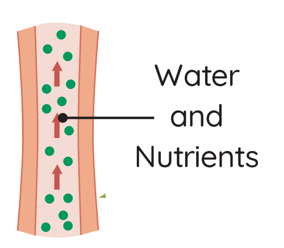
Functions:

1. It transports water and nutrients to the rest of the plant through the xylem.
2. It supports the plant parts.

وظيفة ساق النبات:

1 تنقل العناصر الغذائية لكل أجزاء النبات عن طريق أنابيب تُسمى بأوعية الخشب.

2 تدعم الساق أجزاء النبات.



Xylem tubes carry water and nutrients up from the roots to the leaves.

Types of Stems

1 Wood stem

Tree trunks and shrubs



١- ساق خشبية:

مثل جذوع الأشجار والشجيرات.

2 Upright stem

Most flowers



٢- ساق رأسية مستقيمة:

مثل سيقان أغلب الأزهار.

3 Climb stem

Vine (grapes)



٣- ساق متسلقة:

مثل العنب.

4 Tubers stem (extend underground)

Potato plant

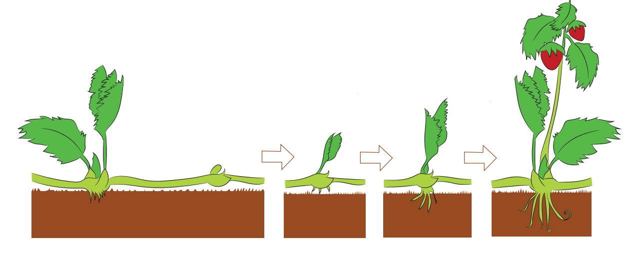


٤- الدرنات (ساق تمتد تحت الأرض):

مثل البطاطس.

5 Runners stem

They extend above and along the ground and help to form new plants.



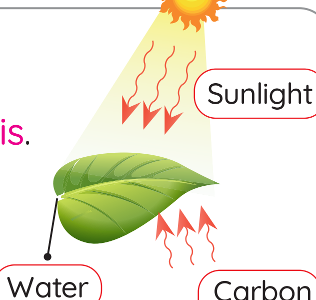
٥- ساق مدادة:

هي ساق تمتد على الأرض، وتساعد في تكوين نباتات جديدة.

3 Plant's leaves:



Functions:



- They make the plant's food through photosynthesis.
- Leaves needs water, carbon dioxide gas and sunlight to make the plant's food (glucose).

وظيفة أوراق النبات: صنع الغذاء من خلال عملية البناء الضوئي.

- لكي تقوم بتلك العملية فإنها تحتاج إلى الماء وغاز ثاني أكسيد الكربون وضوء الشمس.

Types of Leaves

1 Narrow leaves that look like needles such as a pine tree



- أوراق صغيرة تشبه الإبر كأوراق شجرة الصنوبر.

2 Flat and wide leaves



- أوراق مسطحة وعريضة.

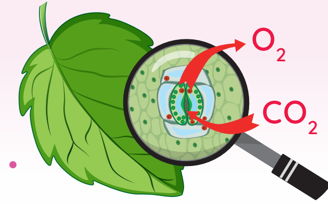
Leaves contain:

Chlorophyll:

- It gives the plants their green color.
- It captures the light energy from the Sun.

- يعطي الأوراق لونها الأخضر.
- يمتص الطاقة الضوئية من أشعة الشمس.

Stomata:



- They are pores on the surface of the leaves that allow gases to move into and out of the plant.

- الثغور: هي فتحات صغيرة موجودة في الأوراق تسمح بمرور الغازات إلى داخل وخارج النبات.



Note:

- There are smaller vessels of xylem that carry water to the leaves.

- توجد أنابيب صغيرة من أوعية الخشب لنقل الماء إلى الأوراق.



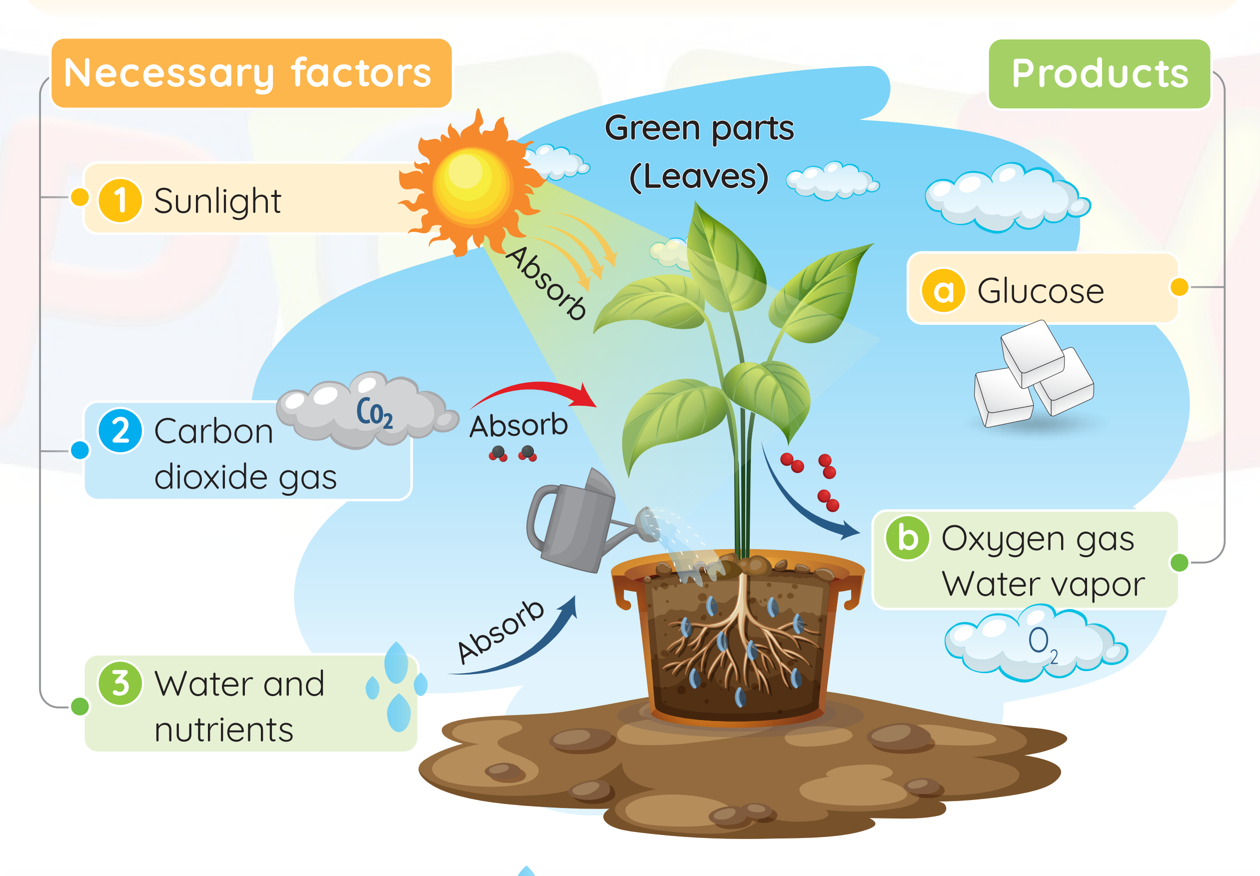
Important Note:

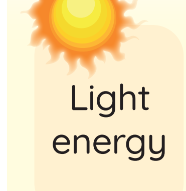
- **Water and nutrients reach the leaves with the help of:**
  1. The plant 's roots.
  2. The xylem in the stem.
  3. The smaller vessels connecting the stem to the leaves.

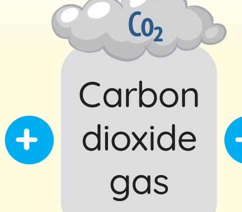
• يصل الماء والعناصر الغذائية إلى الأوراق بمساعدة:
1 جذور النبات. 2 أوعية الخشب في الساق. 3 أنابيب صغيرة مهمتها ربط الساق بالأوراق.

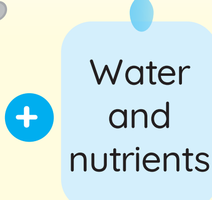
Photosynthesis

It is the process of making food inside a plant's leaves, in which the plant uses the light of the Sun to make its own food.

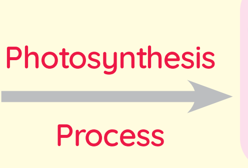


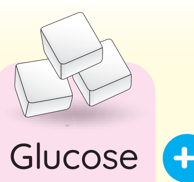
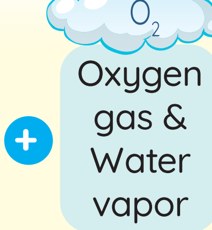


Light energy + 

Carbon dioxide gas + 

Water and nutrients → Photosynthesis Process →



Glucose +  

Oxygen gas & Water vapor

How does the photosynthesis process occur?



1 Chlorophyll captures the light energy from the Sun.

يقوم الكلوروفيل بامتصاص الطاقة الضوئية من الشمس.

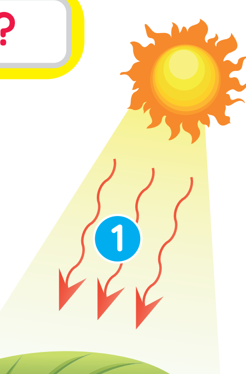
2 Stomata allow air to enter the leaves.

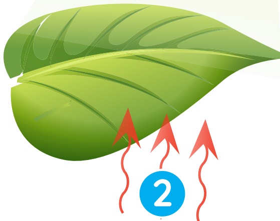
تسمح الثغور في الأوراق للهواء بالمرور إلى النبات.



3 Xylems transport water and nutrients up to the leaves.

تقوم أوعية الخشب بنقل الماء والعناصر الغذائية إلى الأوراق.





» **In the plant leaves,** water combines with carbon dioxide gas in the presence of sunlight to produce glucose.

» يتحد الماء مع غاز ثاني أكسيد الكربون أثناء وجود أشعة الشمس لإنتاج الجلوكوز.

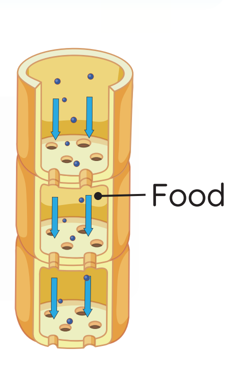


» **Phloems** move glucose from the leaves to the other plant parts.

» تقوم أوعية اللحاء بنقل الجلوكوز من الأوراق لجميع أجزاء النبات.

Phloem: A set of tubes that transport the food from the leaves to other parts of the plant.

أوعية اللحاء: أنابيب مسئولة عن نقل الغذاء من الأوراق إلى أجزاء النبات الأخرى.



» During photosynthesis process,
the plant releases oxygen gas and water vapor in the air.

» أثناء عملية البناء الضوئي، ينتج النبات غاز الأكسجين وبخار الماء في الهواء.

Products of Photosynthesis

1. Nutrients
(such as sugars, starches, fats, and proteins) that the plant needs to live.
2. Oxygen gas that humans and animals need to breathe.

Importance of Photosynthesis

1. It helps the plant produce glucose, then the plant cells use the glucose as a source of energy to live and grow.
2. It releases oxygen gas that humans and animals need to survive.

• أهمية عملية البناء الضوئي:

1 تساعد النبات عل إنتاج الجلوكوز، وتقوم خلايا النبات باستخدام الجلوكوز كمصدر للطاقة لتنمو وتظل على قيد الحياة.

2 أثناء عملية البناء الضوئي يتم إنتاج غاز الأكسجين الذي يحتاجه الإنسان والحيوانات للبقاء.



Important Note:

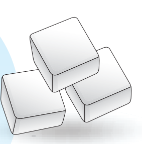
• Life on Earth without plants would be impossible.



Energy Transformation in the Photosynthesis



Light energy absorbed from the sunlight is transformed into chemical energy that is stored in glucose






Activity 7 Up the Stem

Experiment

» In this activity, you will study how water and nutrients transfer from the roots to the stem, then to the plant leaves.

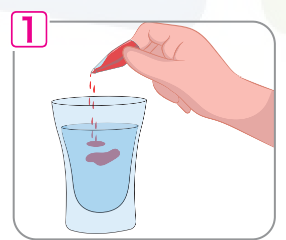
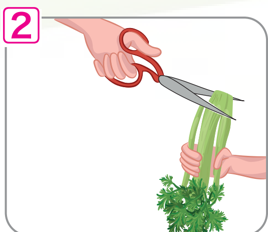
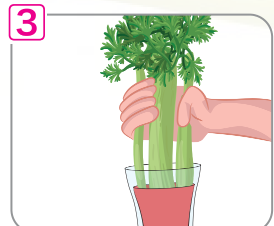
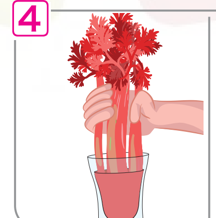
• في هذا النشاط، سوف تتعلم عن كيفية انتقال الماء و العناصر الغذائية من الجذور للساق ثم لأوراق النبات.

Tools:

Celery stalk	Glass cup containing water	Food coloring	Scissors	Hand lens

Steps:

1. Add some drops of food coloring to the water in the glass cup.
2. Cut about 2 cm off the bottom of the celery stalk using the scissors.
3. Leave the celery stalk in the glass cup until the next day.
4. Cut about 5 cm up from the bottom and observe the xylem.

1 
2 
3 
4  

Observation:

» The color of the leaves and xylem of the celery stalk is changed to the red color.

• يتغير لون أوراق وأوعية الخشب في ساق الكرفس للون الأحمر.

Conclusion:

» There are tiny vessels called xylems that carry water and nutrients up from the plant's roots to its leaves and flowers through the stem.

• هناك أوعية (أنابيب) صغيرة جدًّا تسمى أوعية الخشب، تقوم بنقل المياه والعناصر الغذائية لأعلى، من الجذور للأوراق عبر الساق.

Exercises on Lesson 3

1 Choose the correct answer:

1. In photosynthesis, a plant can produce .... as a source of energy.
   a. oxygen gas b. water c. sugar d. rocks
2. Plants release oxygen gas in the air as a basic need for ....
   a. nonliving things b. animals only
   c. humans only d. b and c
3. Xylem transports water and nutrients from the .... to the ....
   a. soil – roots b. roots – stem
   c. roots – leaves d. soil – leaves
4. Stomata are pores that exist on the .... of a plant.
   a. stem b. flower c. fruit d. leaf
5. All the following can reach the plant's leaves, except ....
   a. water b. soil c. nutrients d. air
6. .... and .... are collected by the plant's leaves.
   a. Water – minerals b. Sunlight – nutrients
   c. Oxygen gas – water d. Carbon dioxide gas – sunlight
7. The main function of the plant's roots is ....
   a. supporting the plant's parts b. allowing air to pass
   c. anchoring the plant in the soil d. absorbing sunlight
8. .... increase the amount of water and nutrients absorbed by a plant.
   a. Seeds b. Root hairs c. Xylems d. Leaves
9. There are holes spread on the plant's leaves called ....
   a. stomata b. root hairs c. xylem d. phloem
10. The plant leaf is responsible for all the following functions, except ....
    a. absorbing sunlight b. preparing glucose
    c. allowing passage of air d. transporting food

11 The stem of most flowers is a/an .... stem.

a. climb b. upright c. wood d. tuber

12 The wooden stem is located in ....

a. trunk and potato b. shrubs and flowers

c. trees and shrubs d. tuber and climb

13 A .... stem extends underground, such as a potato.

a. climb b. runner c. wood d. tuber

14 Vine has a/an .... stem.

a. climb b. runner c. upright d. tuber

15 Runner stems extend ....

a. upright b. underground

c. above the ground d. on other trees

16 Pine trees have .... leaves.

a. flat b. wide c. narrow d. hand-shaped

17 Which of the following represents the photosynthesis process?

a. Carbon dioxide + sugar + water → Oxygen + sunlight

b. Oxygen + sugar + water → Carbon dioxide + sunlight

c. Oxygen + sunlight + water → Carbon dioxide + sugar

d. Carbon dioxide + sunlight + water → Oxygen + sugar

18 Which part of the plant transports food from the leaves to all the plant parts?

a. Xylem b. Chlorophyll c. Phloem d. Stomata

19 The plant stores .... energy in the form of glucose.

a. light b. kinetic c. solar d. chemical

20 The .... can capture the light energy of the Sun.

a. xylem b. chlorophyll c. phloem d. stomata

21 The green plant produces all the following substances through photosynthesis process, except ....

a. starch b. fats

c. oxygen gas d. carbon dioxide gas

2 Put (✓) or (✗):

1. Plants and animals are similar in their way of getting their food. (   )
2. Xylems are smaller tubes that transport food from the roots to the leaves. (   )
3. Stomata are responsible for the absorption of sunlight. (   )
4. The xylem allows nutrients to move upward inside the plant. (   )
5. Oxygen gas is released from the photosynthesis process as a waste material for plants. (   )
6. The photosynthesis process takes place inside the plant's leaves. (   )
7. Both humans and plants need gases to survive. (   )
8. Without the Sun, all living organisms will die. (   )
9. The green plant can't make its own food without chlorophyll. (   )
10. Stomata in the plant's leaves act as the respiratory system in humans. (   )
11. The roots of a plant support all the plant parts. (   )
12. Root hairs help the plants to get more amount of water. (   )
13. Pine trees have wood stems and narrow leaves. (   )
14. The stem of potato plants always grow underground in the soil. (   )
15. Vines have upright stems and are considered from tubers. (   )
16. Most flowers have a tuber stem. (   )
17. The xylem moves water rich in nutrients from the soil to the leaves of a plant. (   )
18. A phloem transports glucose to all the plant parts. (   )

3 Write the scientific term:

1. They're structures inside the plant's leaves that are responsible for allowing air to enter. (..................)
2. They're vessels inside the plant's stem that carry nutrients upward. (..................)
3. It's a substance that is produced from photosynthesis process as a source of energy for plants. (..................)
4. It's a structure in the plant that anchors the plant in the soil. (..................)

5 It's a structure in the plant that supports the leaves and flowers. (..........)

6 It's a structure in the plant that increases the absorption of water from the soil. (..........)

7 It's a structure in the plant that gives the leaves their green color. (..........)

8 They're small tubes inside the plant that transport food materials to all plant parts. (..........)

9 It's a kind of stem that extends underground. (..........)

10 It's a kind of stem that extends above the ground. (..........)

11 It's a plant that has narrow leaves and wood stem. (..........)

4 Complete the following sentences:

1 .... can make their own food by themselves, while .... and .... can't.

2 Plants' roots absorb .... and .... from the soil.

3 .... are smaller tubes that carry nutrients up to the plant.

4 The stomata exist in the .... and they absorb .... from the air during photosynthesis.

5 ...., ... and .... are the main parts of a green plant.

6 .... anchors the plant in the soil, while .... give the support for the leaves.

7 Shrubs have a/an .... stem, while .... have an upright stem.

8 A/An .... stem extends underground, while a/an .... stem extends above the ground.

9 Pine trees have .... leaves and .... stems.

10 .... captures the light energy of the Sun.

11 Green plants use the .... energy obtained from the Sun to combine .... and ...., to produce .... and release .... in the air.

5 Cross out the odd word:

1 Plant's leaf – Root hair – Chlorophyll – Stomata (..........)

2 Water – Sunlight – Carbon dioxide gas – Oxygen gas (..........)

6 Choose from column (A) what suits it in column (B):

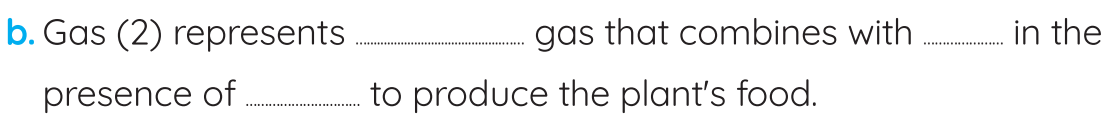
Column (A) Structure inside the plant	Column (B) Function
1 Chlorophyll	a. Transmission of nutrients and water to the plant's leaves.
2 Phloem	b. Allowing the needed air to enter the leaf.
3 Stomata	c. Absorbing the sunlight.
4 Xylem	d. Increasing the absorption of water and nutrients from the soil.
5 Root hairs	e. Transmission of food from the plant's leaf.

1 .... 2 .... 3 .... 4 .... 5 ....

7 Study the following figures, then answer the questions:

1 The opposite figure represents a green plant, complete the following sentences:

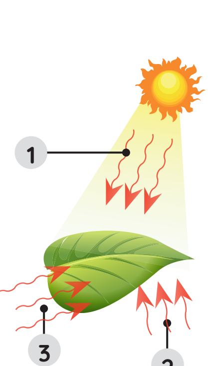
a. Gas (1) represents .... gas that is considered a waste material for .... and an essential material for the ....



b. Gas (2) represents .... gas that combines with .... in the presence of .... to produce the plant's food.

2 The opposite figure represents the .... process.

The needed three essential elements:



Element 1 represents .... that is absorbed by ....

Element 2 represents .... that is absorbed by ....

Element 3 represents .... that is carried by the .... to reach the leaf.

8 Give reasons for:

1. Plants and humans are different in the way of getting food.

....

2. Stomata exist on the plant's leaf.

....

3. The xylem plays an important role for plants.

....

4. The presence of roots' hair in the plant's structure.

....

5. Chlorophyll plays an important role in the photosynthesis process.

....

6. Photosynthesis process is necessary for life continuity.

....

9 What happens if:

1. There is no xylem inside the plant?

....

2. There is no stomata on the plant's leaves?

....

3. The plant's leaf doesn't contain chlorophyll?

....

4. A celery stalk is placed in a cup that contains a blue liquid?

....

Lesson 4



Activity  8 Comparing Plant and Human Systems



How do humans and plants obtain the energy and gases needed for survival and growth 

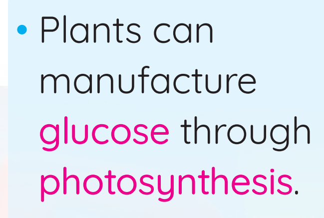
a. Getting Energy

Plants



- Plants can manufacture glucose through photosynthesis.

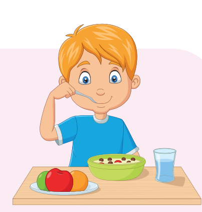
- يحصل النبات على الجلوكوز من خلال عملية البناء الضوئي.



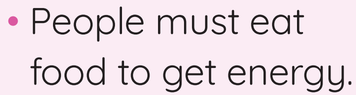
Glucose

It is a sugar that is produced through photosynthesis and provides the plant with energy.

Humans



- People must eat food to get energy.
- Our bodies get energy from food by the help of the digestive system that digests food to get nutrients and glucose that are being absorbed to enter the blood stream.

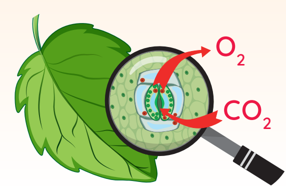


- يحصل الإنسان على الطاقة عندما يتناول الطعام.
- تحصل أجسامنا على الطاقة بمساعدة الجهاز الهضمي الذي يهضم الطعام ويساعدنا على الحصول على العناصر الغذائية والجلوكوز الذي يتم امتصاصه لدخول مجرى الدم.

b. Getting Gases

Plants

- Gases enter plants through the stomata in the leaves.



- تدخل الغازات إلى النباتات من خلال الثغور في الأوراق.

Humans

- Air enters the human body through our mouth and nose, then travels to the lungs, where oxygen is absorbed into the blood circulation.

O_2



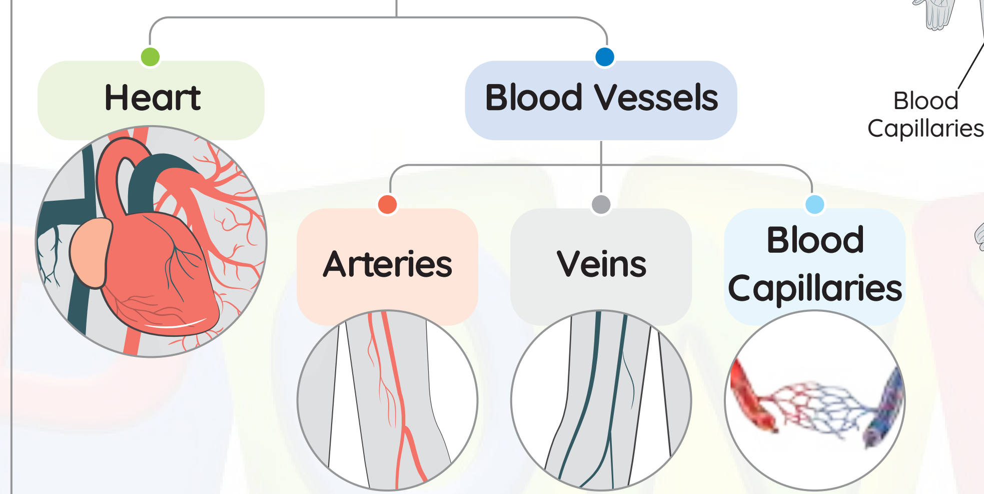
- يدخل الهواء إلى جسم الإنسان من خلال الفم والأنف ثم ينتقل إلى الرئتين، حيث يتم امتصاص الأكسجين في الدورة الدموية.

Comparing Plants and Humans Systems

1 Human Circulatory System:

It is the system that transports blood and other fluids throughout the body.

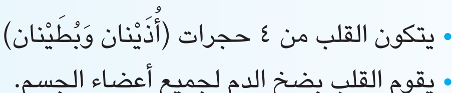
The circulatory system consists of



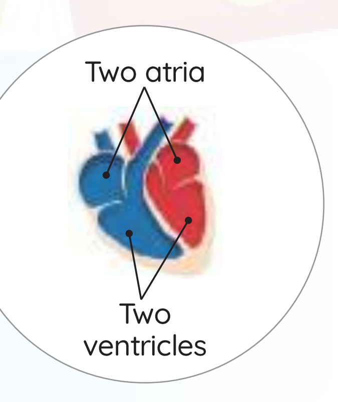


1 Heart

- The heart has four chambers:
  two atria and two ventricles.
- It pumps the blood to all the body parts.



• يتكون القلب من ٤ حجرات (أُذَيْنان وَبُطَيْنان).
• يقوم القلب بضخ الدم لجميع أعضاء الجسم.



2 Blood Vessels

- They are tubes that transport nutrients and oxygen through the blood to the cells and organs.

• الأوعية الدموية: عبارة عن أنابيب مسئولة عن نقل العناصر الغذائية والأكسجين خلال الدم إلى خلايا الجسم وأعضائه.





Arteries

They carry the blood rich in oxygen and nutrients (glucose) from the heart to the organs, muscles, bones, and cells, so that the body can grow and heal.

الشرايين

تقوم بنقل الدم الغني بالأكسجين والجلوكوز من القلب إلى الأعضاء والعضلات والعظام والخلايا؛ حتى يتمكن الجسم من النمو والشفاء.

Veins

Veins return the blood that carries carbon dioxide gas and is low in nutrients and oxygen back to the heart, then to the lungs for the blood to be loaded with oxygen again.

الأوردة

تعيد الأوردة الدم الذي يحمل ثاني أكسيد الكربون والقليل من العناصر الغذائية والأكسجين إلى القلب ثم إلى الرئتين؛ ليتم تزويد الدم بالأكسجين مرة أخرى.

- Blood moves in only one way (direction) in human veins or arteries.

• يتحرك الدم في اتجاه واحد عبر أوردة الإنسان أو شرايينه.



Important Note:

- You can see your veins and arteries through your skin on your hands or arms.

• إذا نظرت إلى يديك يمكنك ملاحظة شكل الأوردة والشرايين الموجودة تحت الجلد.



2 Plants Transport System (Plant Vascular System):

It is the system that moves water, nutrients and the plant's food through the vessels inside the plant.

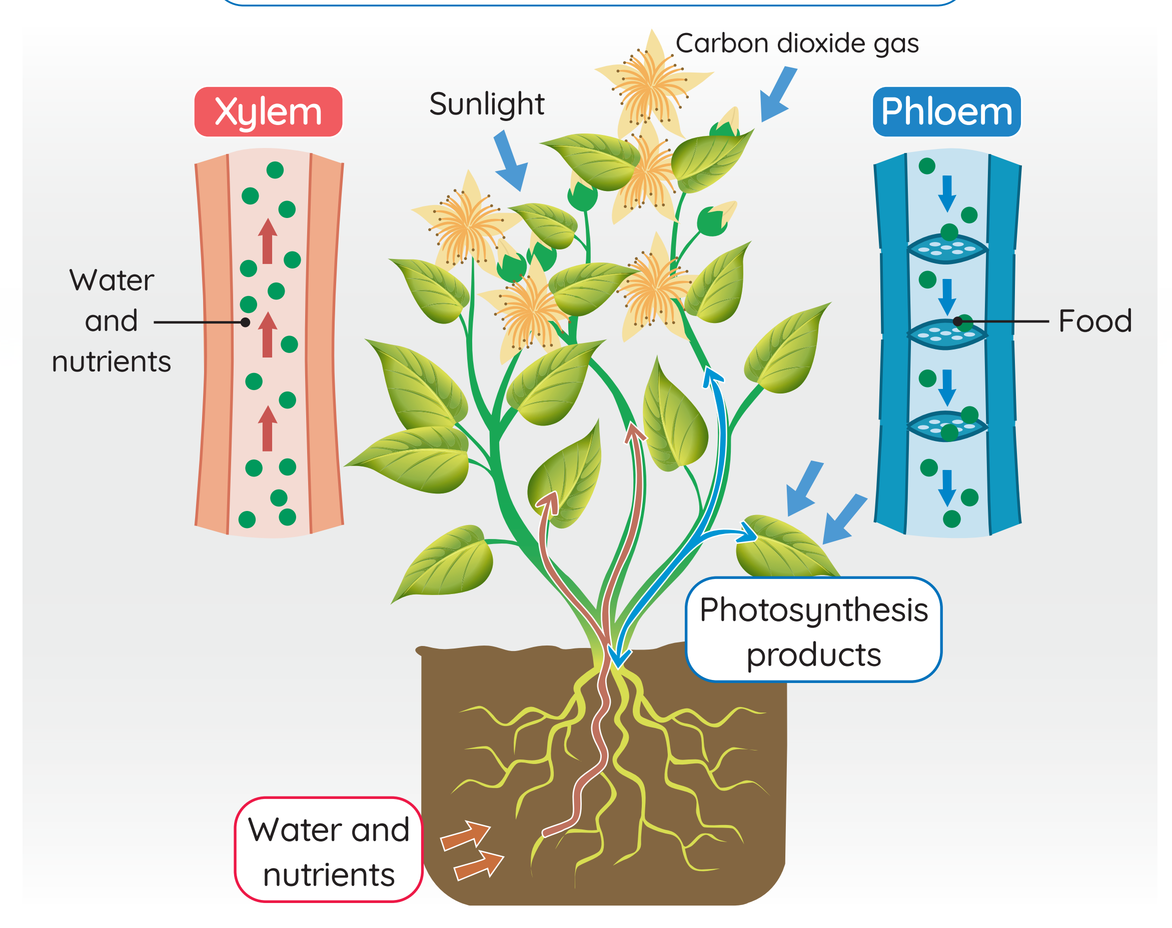
Xylems

They allow water and nutrients to travel upward from the **roots** to the **leaves**.

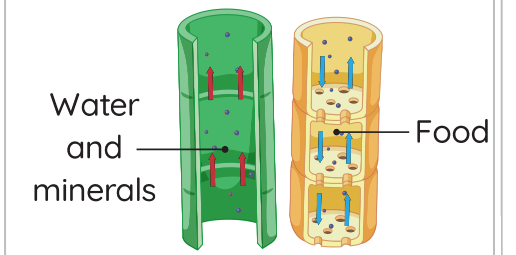
- With the arrival of water, the leaves begin to manufacture glucose.

Phloems

They carry the glucose from the **leaves** to the **other parts** of the plant.



- تسمح **أوعية الخشب** بانتقال الماء والعناصر الغذائية إلى أعلى من الجذور للأوراق.
- بوصول الماء إلى الأوراق تبدأ بتصنيع الجلوكوز.
- تقوم **أوعية اللحاء** بنقل الجلوكوز من الأوراق لباقي أجزاء النبات.

P.O.C	Plant Transport System	Human Circulatory System
Picture		
Differences	It consists of: 1 Xylem 2 Phloem	It consists of: 1 Arteries 2 Veins 3 Blood capillaries
Similarities	1 Both of them have vessels that transport water, nutrients and gases to all body parts. 2 Both have one-way vessels. • يقومان بنقل الماء والعناصر الغذائية والغازات اللازمة إلى جميع أجزاء الجسم. • كلاهما يحتوي على أنابيب أحادية الاتجاه.	

Science Facts 

Blood capillaries

Description:

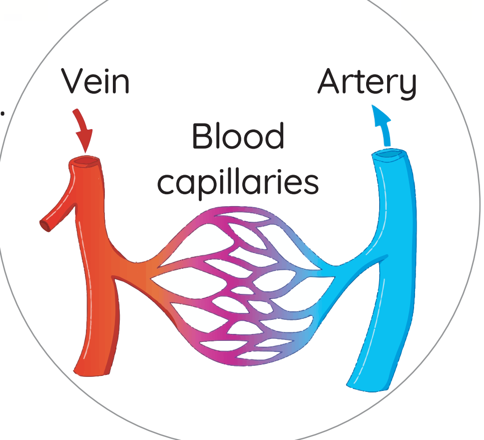
- They are a network of tiny blood vessels.

Location:

- They exist around the body cells.

Function:

- They connect the ends of arteries with the beginnings of veins.





Activity 9 Plant Food





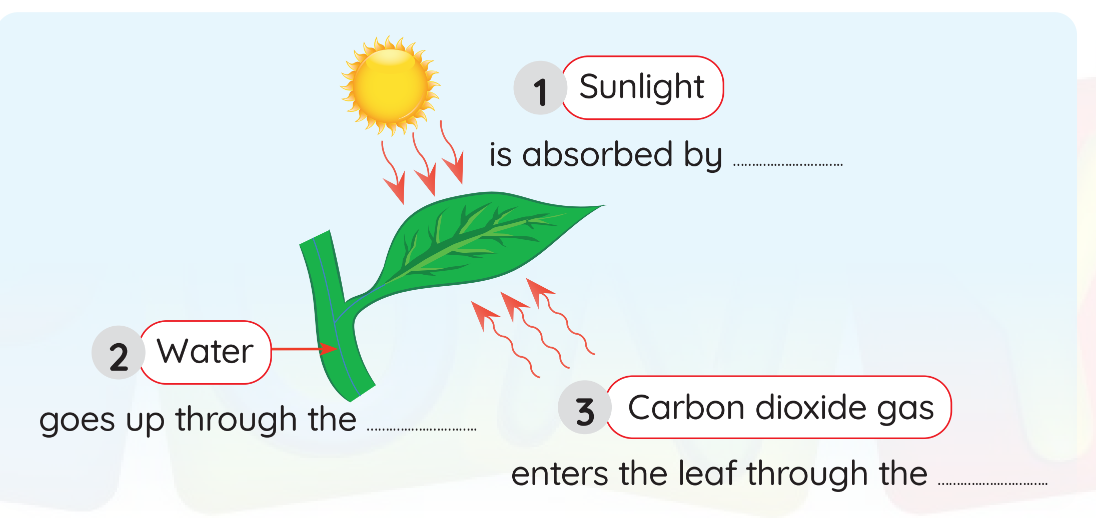
Unit 1

1 Complete the following sentences:

Green leaves use the .... energy of the .... to combine .... with .... to produce:

1. Nutrients such as sugars, ..., ..., and proteins.
2. .... gas that humans and animals need.

2 Complete the following diagram:



3 Arrange the following steps:

a (..........) Plant parts use glucose for their needs, such as growth.

b (..........) Vessels move glucose from the leaves to other parts of the plant.

c (..........) Plants release oxygen gas that other living things need.

d (..........) Light from the Sun hits the plant's leaves.

e (..........) The leaves transform the light energy from the Sun into glucose.

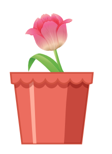
Concept 1



Activity 10 Flowers and Seeds

Flowers of plants have different







- Shapes
- Colors
- Sizes

» Some flowers are colorful and others are not very colorful.

» Some flowers are large, and others are very small that are hardly seen, such as grass.

- تختلف الأزهار في أشكالها وأحجامها وألوانها.
- بعض النباتات أزهارها زاهية الألوان وبعض النباتات الأخرى أزهارها ليست زاهية الألوان.
- بعض النباتات أزهارها كبيرة وبعض النباتات الأخرى أزهارها صغيرة جدًّا تصعب ملاحظتها مثل العشب.

Flowers' function (job)

Flowers help the plant to reproduce.



How?

» As they produce seeds, and when the seeds receive air, water and the suitable temperature, they will grow into a new plant.

- تساعد الأزهار النباتات على التكاثر؛ وذلك لأنها تنتج البذور،
وعندما تحصل البذور على الهواء والماء ودرجة الحرارة المناسبة فإنها تؤدي لنمو نبات جديد.

Flowers: They are the reproductive parts of many plants.

Plant reproduction: It is the process of making new plants.

Sunflowers

They have small, dark-colored seeds in the center of the flower.

زهرة عباد الشمس:

تمتلك بذورًا صغيرة داكنة في وسط الزهرة.

Exercises on Lesson 4

1 Choose the correct answer:

1. Plants can get their energy and make their own food through the .... process.
   a. digestion b. respiration c. thinking d. photosynthesis
2. The .... system helps humans and animals get the energy they need from food.
   a. nervous b. circulatory c. digestive d. skeletal
3. The human circulatory system includes all the following structures, except the ....
   a. heart b. vein c. artery d. lungs
4. Blood vessels carry all the following components, except ....
   a. acids b. oxygen gas
   c. carbon dioxide gas d. nutrients
5. .... carry the blood rich in oxygen from the heart to all the body cells.
   a. Xylems b. Arteries c. Veins d. Nerves
6. Both of .... and .... are similar in carrying nutrients.
   a. arteries – phloems b. veins – xylems
   c. arteries – xylems d. veins – phloems
7. Veins carry the blood rich in .... to the heart.
   a. nutrients b. oxygen gas
   c. carbon dioxide gas d. water
8. .... transport the water rich in nutrients up the plant.
   a. Stomata b. Veins c. Arteries d. Xylems
9. The .... is/are responsible for the transmission of food from the leaves to all plant parts.
   a. chlorophyll b. stomata c. xylem d. phloem
10. The human circulatory system and the plant transport system are similar in ....
    a. structure b. function c. shape d. color

11 The .... has very small flowers that can hardly be seen.

a. sunflower b. grass c. rose d. vine

12 Most flowers are similar in ....

a. size b. color c. job d. shape

2 Put (✓) or (✗):

1 The transport system in plants helps feed and water all the plant parts. ( )

2 Air enters the human body through the lungs. ( )

3 You can't see the veins and arteries inside your body. ( )

4 Blood moves in the human body in one direction. ( )

5 In both plants and humans, networks of vessels transport materials that sustain life. ( )

6 Veins carry the blood rich in carbon dioxide gas to all body cells. ( )

7 Nutrients in the xylem move upward in one direction. ( )

8 Glucose is produced in plants by the digestion process. ( )

9 In photosynthesis, light energy is changed into chemical energy. ( )

10 Carbon dioxide gas is a waste material for all living organisms. ( )

11 Energy can't be transformed from one form to another. ( )

3 Write the scientific term:

1 They are vessels that carry the blood rich in oxygen and glucose from the heart to the body organs. (....................)

2 They are vessels that return the blood that carries carbon dioxide gas to the heart for a recharge. (....................)

3 It's a system inside the human body that helps in getting the needed energy from humans' food. (....................)

4 It's a system inside the human body that includes the heart and blood vessels. (....................)

5 It exists inside the leaf and is responsible for absorbing the sunlight from the Sun. (....................)

6 It's a vessel that carry glucose from the plant's leaf to all the plant parts. (....................)

7 They're vessels that carry nutrients from the plant's roots to all the plant's leaves. (..................)

8 It's a part of the plant that is responsible for producing the seeds. (..................)

9 It is the process of producing new plants. (..................)

4 Complete the following sentences:

1 Plants can manufacture their own food through the .... process.

2 Air enters the human's body through the .... and ...., then travels to the ...., where oxygen is absorbed into the circulating blood.

3 As we chew and swallow our food, nutrients are absorbed into the ....

4 There are three different types of blood vessels that are called ...., ..., and ....

5 Blood moves in .... direction in humans' veins or arteries.

6 .... carry the blood rich in oxygen and glucose away from the heart.

7 .... return the blood that carries carbon dioxide gas back to the heart for a recharge.

8 .... transport the water rich in nutrients from the roots of the plant to the leaves.

9 .... starts to manufacture glucose when water reaches it.

10 The .... carries the glucose to other parts of the plant.

11 As plant cells use glucose, they release .... and .... in the air.

12 Flowers of plants have different .... or ...., while they have the same ....

5 Cross out the odd word:

1 Photosynthesis – Chemical energy – Thermal energy – Light energy

2 Xylem – Stomata – Veins – Phloem

3 Flower – Stem – Roots – Leaf – Blood

6 Classify the following words in the tables below:

Xylem – Veins – Blood capillaries – Phloem – Arteries – Heart

Human Circulatory System	Plant Transport System
....	....
....	....

7 Choose from column (A) what suits it in column (B):

Column (A) The part	Column (B) It's function
1 Veins	a. Transmission of nutrients and water to the plant's leaves.
2 Phloem	b. Transmission of the blood that carries carbon dioxide gas to the heart.
3 Arteries	c. Transmission of food from a plant's leaf to other plant parts.
4 Xylem	d. Transmission of blood rich in oxygen gas and nutrients to all cells.
5 Flower	e. Responsible for reproduction in plants.

1 .... 2 .... 3 .... 4 .... 5 ....

8 Give reasons for:

1. The xylem plays an important role in the survival of plants.
2. The phloem plays an important role in the growth of plants.
3. The heart plays an important role in the blood circulation.
4. The human body contains arteries and veins.
5. Flowers are called the reproductive parts of plants.

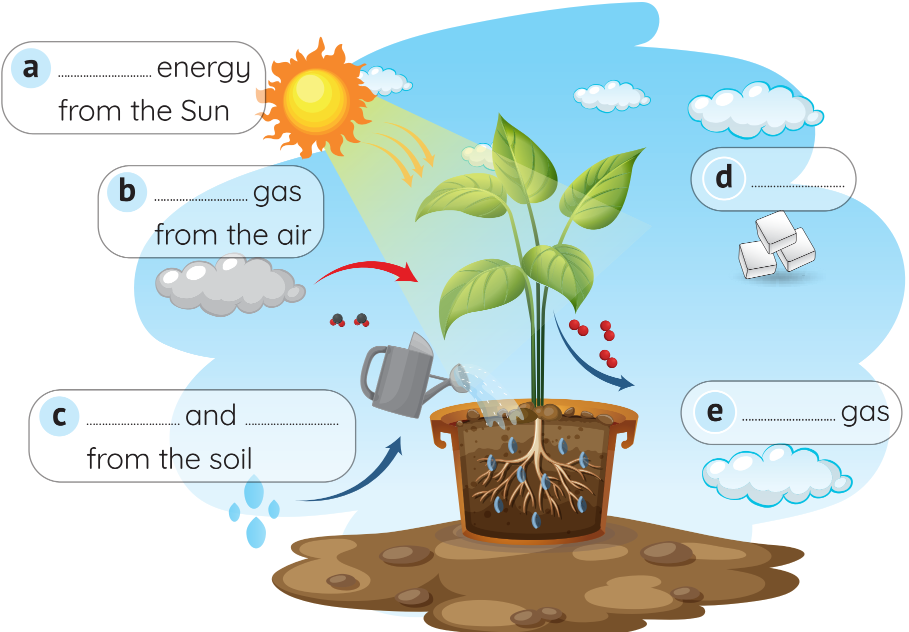
9 What happens if:

1. There is no xylem inside the plant?
2. There are no arteries inside the human?

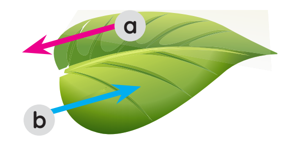
Unit 1

10 Study the following figure, then answer the questions:

1 **The following figure represents the photosynthesis process, complete the following:**



2 **The following figure represents a plant's leaf. Complete the sentences below:**



a It is the .... and it is responsible for ....

b It is the .... and it is responsible for ....

3 **The following figure represents the blood vessels inside humans. Complete the following:**



a Structure (......) carries the blood rich in oxygen gas and nutrients to the ....

b Structure (......) carries the blood rich in carbon dioxide gas to the ....

c The blood moves through them in .... direction.

4 **Study the opposite figure, then complete:**

a This figure represents the .... system.

b Arteries transport blood from the .... to the ....

c Veins transport blood from the .... to the ....



Lesson 5



Activity 11 Seed Dispersal

Seed dispersal: It is the transportation of the seeds from one place to another.

» The way of seed dispersal depends on the shape and size of the seed, as in the following examples:

• طريقة انتشار البذور يحددها شكل وحجم البذرة كما بالأمثلة التالية:

Ways of Seed Dispersal

1 Floating on the water's surface



Coconut seed
بذرة جوز الهند

2 Traveling by wind (light and feathery)



Maple seed
بذرة القيقب



Dandelion seed
بذرة الهندباء

3 Sticking on animals' fur or on humans clothing



Plum seeds (Rough and have spines)
بذرة البرقوق

4 Eaten by animals and come out with their stool



Tomato seed
بذرة الطماطم



Apple seed
بذرة التفاح





Note:

- Seeds must travel away from their parent plant, so that a young plant will not have to compete with an established plant for resources.
- يجب أن تنتقل البذور بعيدًا عن نباتها الأصلي حتى لا يضطر النبات الصغير إلى التنافس مع نبات بالغ على الموارد.



Activity 12 Record Evidence Like a Scientist: Tree Needs



» Now that you have learned about plant needs, look again at the image of planting a tree. You first saw this in Wonder.



Question:

» How do plant parts make use of water, air, and light for vital processes?



My Claim:

....

....

Evidence:

....

....



Scientific Explanation with Reasoning:

....

....

....

Exercises on Lesson 5

1 Choose the correct answer:

1. .... is a process that helps seeds move farther away from their parents to another place.
   a. Photosynthesis b. Germination c. Reproduction d. Seed dispersal
2. Plum seeds can be dispersed by animals because they are .... seeds.
   a. light b. rough c. heavy d. smooth
3. All the following can help in seed dispersal, except the ....
   a. wind b. water c. Sun d. human
4. .... seeds can float on the water's surface to reach other places.
   a. Maple b. Plum c. Coconut d. Dandelion
5. .... and .... have wing-like seeds.
   a. Maple – dandelion b. Plum – maple
   c. Coconut – apple d. Dandelion – plum

2 Put (✓) or (✗):

1. Some seeds travel by an animal's digestive system to a new location. (   )
2. Humans can help in transferring the seeds from one place to another. (   )
3. Tomato seeds and plum seeds can be dispersed by animals. (   )
4. Maple seeds can be dispersed by the blowing wind. (   )
5. Apple seeds and tomato seeds disperse in the same way. (   )

3 Write the scientific term:

1. It's a miniature plant waiting to grow. (................)
2. It's a process of transferring the seeds from one place to another. (................)
3. It's a way to disperse light seeds. (................)
4. It's a way to disperse coconut seeds. (................)

4 Complete the following sentences:

1. .... seeds and .... seeds are eaten by animals and come out with their stool.
2. Plum seed can be dispersed by .... or ....
3. .... seeds can travel by the wind because they are .... seeds.
4. Coconut seeds can .... on the water.

5 Classify the following plants according to the way of dispersal:

Plum seeds	Coconut seeds	Dandelion seeds

1 .... 2 .... 3 ....

6 Mention three examples of seeds that can be dispersed by animals.

1 .... 2 .... 3 ....

7 Give reasons for:

1. A farmer found seeds that are not from the seeds of his farm.

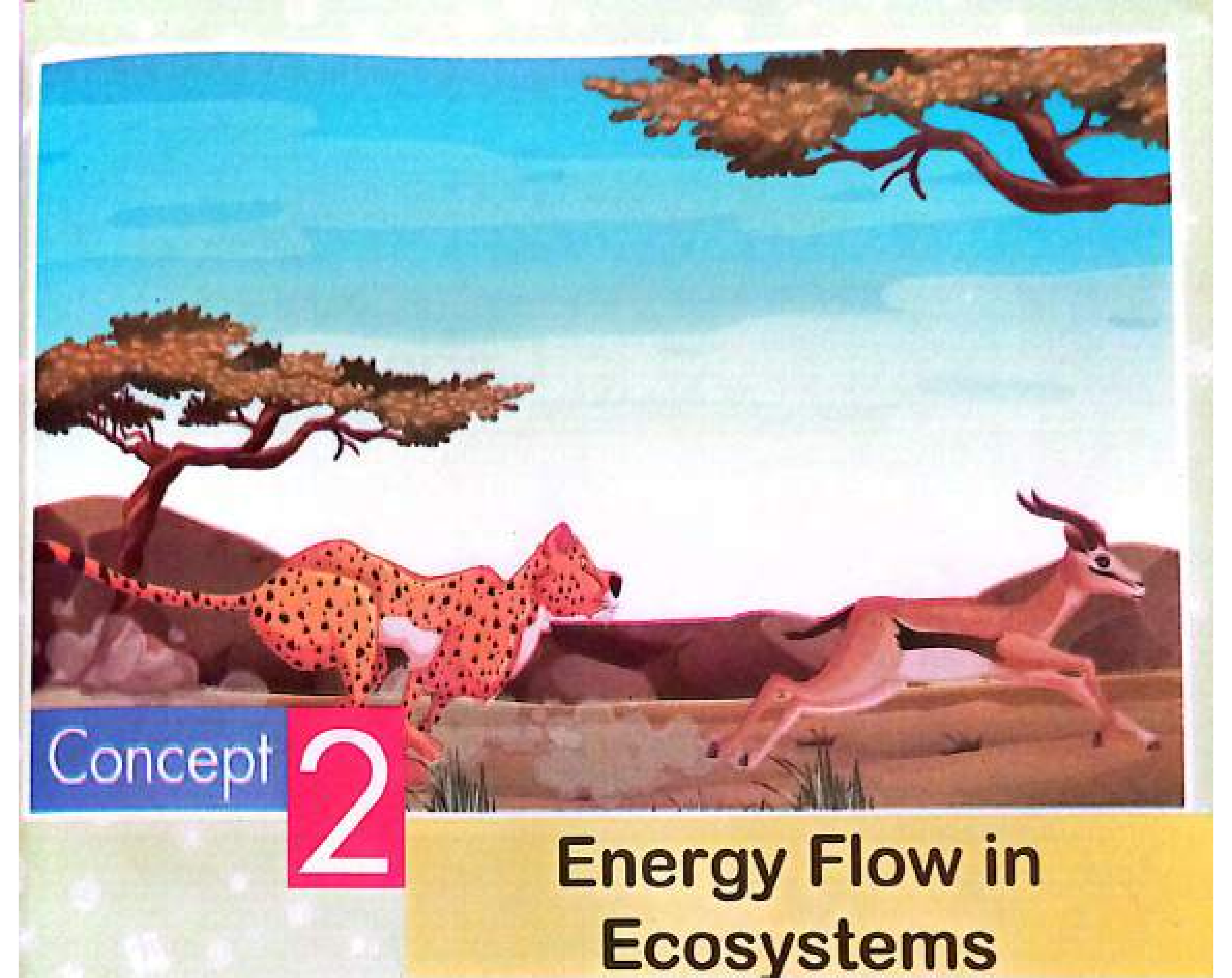
   ....

2. Maple seeds and dandelion seeds can be dispersed by the wind.

   ....

3. Plum seeds can be dispersed by animals' fur.

   ....



Concept 2

Energy Flow in Ecosystems

Concept Objectives:

By the end of this concept, students will be able to:

- Develop a model to show how energy moves through an ecosystem.
- Create a model to explain the different roles that organisms play in an ecosystem.
- Explain how the health of each type of organism in an ecosystem impacts the overall health of the community.

Key Vocabulary:

- Consumers
- Decomposers
- Producers
- Cycle
- Ecosystem
- Food chain
- Food web
- Interact
- Predator
- Prey

Concept 2

Energy Flow in Ecosystems

Lesson 1	
Activity 1	Can you explain?
Activity 2	How Hawks Get Energy
Activity 3	What Do You Already Know About Energy Flow in Ecosystems?

Lesson 2	
Activity 4	Food Is Energy
Activity 5	Food Chains
Activity 6	Energy Flow

Lesson 3	
Activity 7	Food Chain
Activity 8	Food Webs
Activity 9	Interactions in Food Webs

Lesson 4	
Activity 10	Record Evidence Like a Scientist: How Hawks Get Energy
Activity 11	Plant-Community Ecologist

Lesson 1




Activity 1 Can You Explain?

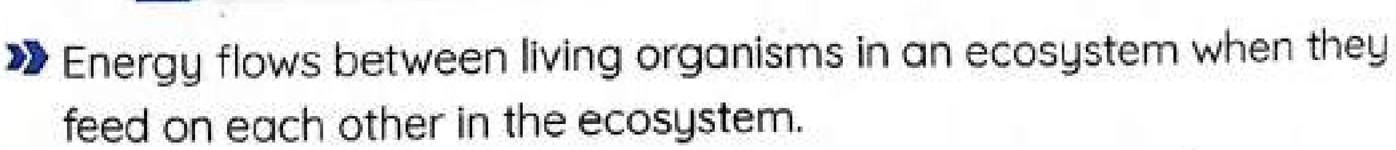


The pictures above show different ecosystems.

- An ecosystem consists of organisms and their environment.
- Living organisms, such as plants, animals, and even humans are all part of an ecosystem.

Ecosystem • It is a community that contains living organisms and nonliving things that interact with each other.





How does energy flow through an ecosystem?

- Energy flows between living organisms in an ecosystem when they feed on each other in the ecosystem.
- When a living organism dies, its energy returns to the soil.




• تنتقل الطاقة بين الكائنات الحية في النظام البيئي حين يتغذى بعضها على البعض الآخر.
• بعد موت الكائن الحي تعود طاقته إلى التربة.





Activity 2 How Hawks Get Energy



- Hawks are meat-eating animals.
- To get energy, hawks eat snakes, mice, fish, birds, squirrels, rabbits, and other small ground animals.
- Hawks don't eat plants, but they eat animals that eat plants. So, they also depend on plants to get energy.
- Hawks are attacked by few predators, such as eagles and other hawks.

تبر الصقور من آكلات اللحوم.

حصول على الطاقة، تأكل الصقور الثعابين، والفئران، والأسماك، والطيور، والسناجب، والأرانب، وحيوانات الأرض الصغيرة.

تأكل الصقور النباتات، لكنها تأكل الحيوانات التي تأكل النباتات؛ لذلك فإنها تعتمد بشكل غير مباشر على النبات للحصول ى الطاقة.

تعرض الصقور لهجوم القليل من الحيوانات المفترسة مثل النسور أو الصقور الأخرى.



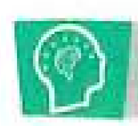
What happens when hawks die



- Their bodies decompose and their energy returns to the soil.
- The food chain continues because decomposers have obtained energy by consuming the hawk.

ماذا يحدث عندما تموت الصقور؟

- عندما تموت الصقور، تتحلل أجسامها وتعود الطاقة مرة أخرى إلى التربة.
- تستمر السلسلة الغذائية؛ لأن الكائنات المُحَلِّلة حصلت على الطاقة عن طريق تحليل الصقور.



Activity  What Do You Already Know About Energy Flow in Ecosystems?

» A **healthy ecosystem** helps living organisms **survive** by providing **food**, **water**, and **shelter** for them.

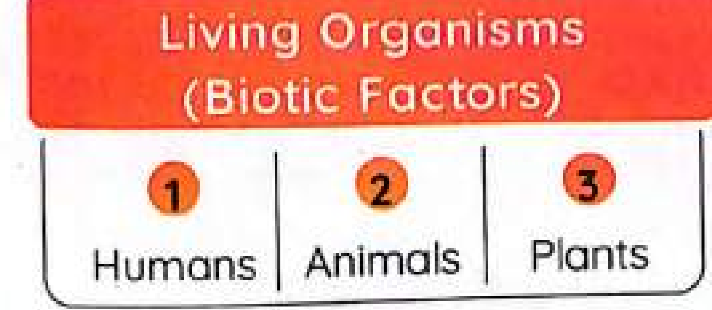




• يساعد النظام البيئي الصحي الكائنات الحية على البقاء على قيد الحياة عن طريق توفير الغذاء والماء والمأوى لها.



Ecosystem Components







Unit 1

What Do Animals Eat?

» Animals don't choose their food according to its taste, but they eat what their bodies need.

• لا تختار الحيوانات غذاءها حسب الطعم ولكن غذاء الحيوانات مرتبط بمدى حاجة جسمها إلى هذا الغذاء للبقاء.

Examples

Rabbit → eats → grass

Bird → eats → worms

Caracal → eats → mouse

Give a reason for...

- There is a relationship between the energy we get from food and the Sun.

Because plants use sunlight to make their own food, then humans and animals depend on plants to get energy.

...es on Lesson 1

1 Choose the correct answer:

1. All the following are ecosystems, except the ....
   a. desert b. tundra c. rainforest d. space
2. An ecosystem consists of ....
   a. living organisms only b. nonliving things only
   c. living organisms and nonliving things
   d. no correct answer
3. .... is considered an abiotic factor.
   a. Grass b. A human c. A bird d. The sea
4. All .... need a source of energy.
   a. oceans b. metals c. rocks d. living things
5. When the rabbit dies in the desert, its body will ....
   a. grow b. decompose c. freeze d. stay
6. A .... is a living organism that can make its own food.
   a. hawk b. frog c. tree d. camel
7. Hawks can get energy from eating ....
   a. snakes b. plants c. lions d. eagles
8. A few predators can attack hawks, such as ....
   a. snakes b. rabbits c. birds d. eagles
9. Some birds can obtain their energy from eating ....
   a. grass b. worms c. mice d. lions

2 Put (✓) or (✗):

1. Living things must interact with nonliving things to survive. ( )
2. Dead organisms don't need energy. ( )
3. Water and soil are nonliving things that help plants grow. ( )
4. A green plant is the only nonliving thing that can make its own food. ( )
5. Hawks don't eat plants, but they depend on them to get energy. ( )
6. If a snake dies, its energy will go to the soil. ( )
7. All organisms are similar in the way they get energy. ( )

3 Write the scientific term:

1. It's a community that includes living organisms and nonliving things. (..........)
2. They're the only organisms that can manufacture their own food. (..........)
3. It's a nonliving thing that provides plants with nutrients. (..........)

4 Complete the following sentences using the words between the brackets:

(Light - rabbits - Chemical - escape from - eagles - feed on - soil - water - air)

1. The energy in dead organisms goes to the ....
2. Energy transfers between animals when they .... each other.
3. Animals must .... danger to survive.
4. .... is a nonliving thing that provides plants with carbon dioxide gas.
5. .... energy stored in all living organisms bodies.
6. Hawks can get their energy from ...., while they may be attacked by some predators, such as ....

5 Cross out the odd word:

1. Desert - Sea - Space - Rainforest (..........)
2. Grass - Soil - Water - Air (..........)

6 Classify the following words in the tables below:

- Water - Bacteria - Air - Grass - Soil - Palm tree - Human - Oxygen gas

Biotic Factors	Abiotic Factors
....	....
....	....

7 Give reasons for:

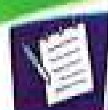
1. Animals search for food every day.
2. Hawks get energy from plants, although hawks don't eat plants.

8 What happens if:

- The hawks die?



Concept 2



Activity  Food Is Energy

» All living things need energy. G.R

To live, grow, and carry out vital processes.



How do we get energy 

» We get energy from the food we eat and the oxygen we breathe.

• نحصل على الطاقة من خلال الغذاء الذي نأكله والأكسجين الذي نتنفسه.

Energy helps us in

Breathing	Thinking	Moving	Doing activities
			

Some activities require a lot of energy such as:
hard work and physical exercises.



Our bodies still use energy even when we sleep.



» If we eat junk food, we may feel sick or tired. When we do not eat enough, we may feel weak.

• إذا أكلنا الوجبات السريعة، فقد نشعر بالتعب أو الإرهاق، إلا أنه عندما لا نأكل طعامًا كافيًا، فقد نشعر بالضعف.

Sun:

- The Sun is the primary source of energy for all living organisms on Earth to live, grow, and carry out vital processes.

Plants:

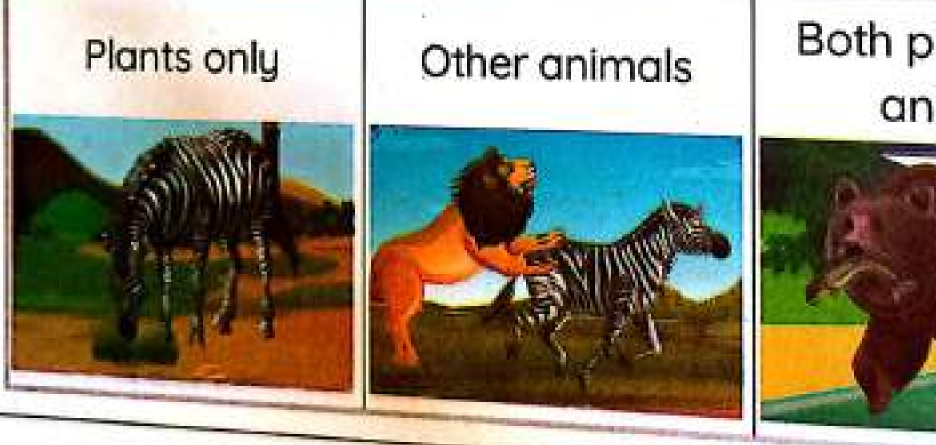
- Plants can make their own food (glucose) inside their leaves through photosynthesis process.
- Plants absorb sunlight to convert water and carbon dioxide gas into glucose.

Animals:

- Animals cannot make their own food.
- Animals get energy from their environment.

Some animals feed on:

Plants only	Other animals	Both plants and animals



The energy produced from the Sun passes through all living organisms on Earth.

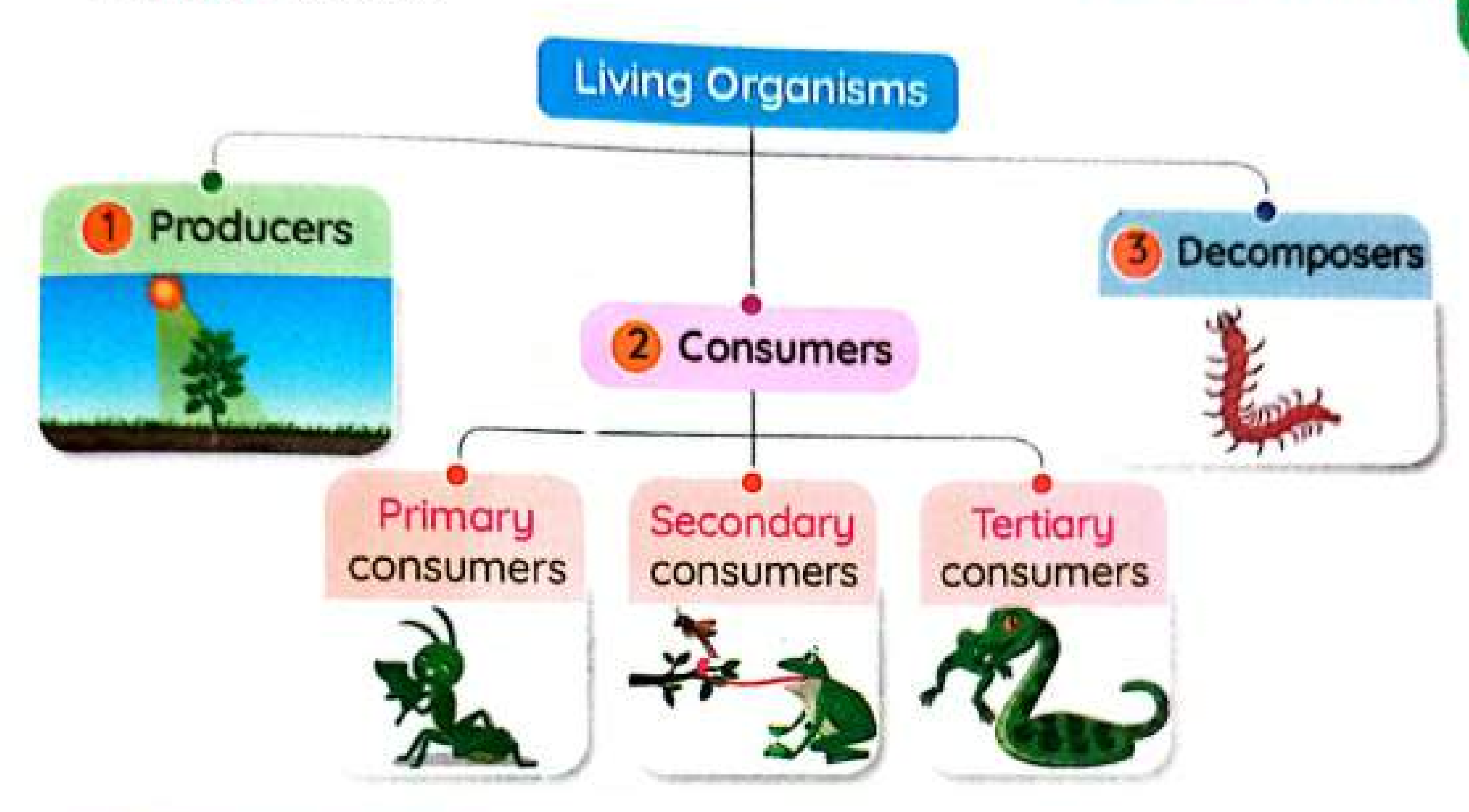
تنتقل الطاقة الشمسية عبر الكائنات الحية على كوكب الأرض.





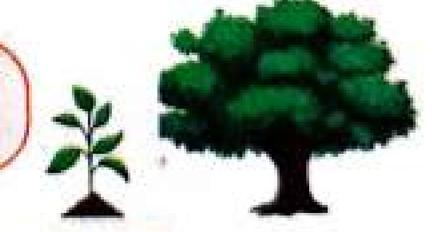
Activity 5 Food Chains

- All living organisms need energy to live.
- Some living organisms can produce their own food, while others can't.
- Living organisms are classified according to their ways of getting food into three groups:



1 Producers:

They are living organisms that can make their own food in the presence of sunlight.



- Nearly all producers on Earth are green plants. G.R
  Because green plants can make their own food (glucose) in their leaves through the photosynthesis process.

Primary consumers	كائنات مستهلكة أولية	Food chain	سلسلة غذائية
Secondary consumers	كائنات مستهلكة ثانوية	Producers	كائنات منتجة
Tertiary consumers	كائنات مستهلكة درجة ثالثة	Decomposers	كائنات مُحلِّلة

2 Consumers:

They are living organisms that feed on other living organisms to get energy because they can't make their own food.

Consumers are classified into

Primary Consumers	Secondary Consumers	Tertiary Consumers
They are animals that eat producers. (Green plants)	They are animals that eat primary consumers.	They are animals that eat secondary consumers.
Examples		
Many Insects	Birds	Large meat-eating animals Alligators
		

Important Notes:

- The Sun is the main source of energy for all living organisms.
- Green plants are producers.
- Animals and humans are consumers.
- Humans can be primary consumers or secondary consumers.

3 Decomposers:

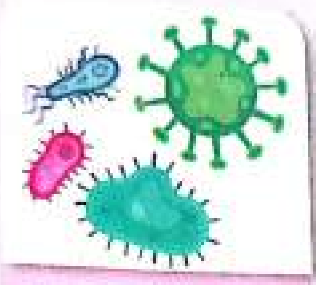
They are living organisms that carry out the decomposition process by breaking down or decaying dead organisms.

Examples:





Fungi



Bacteria



Some worms

Importance:

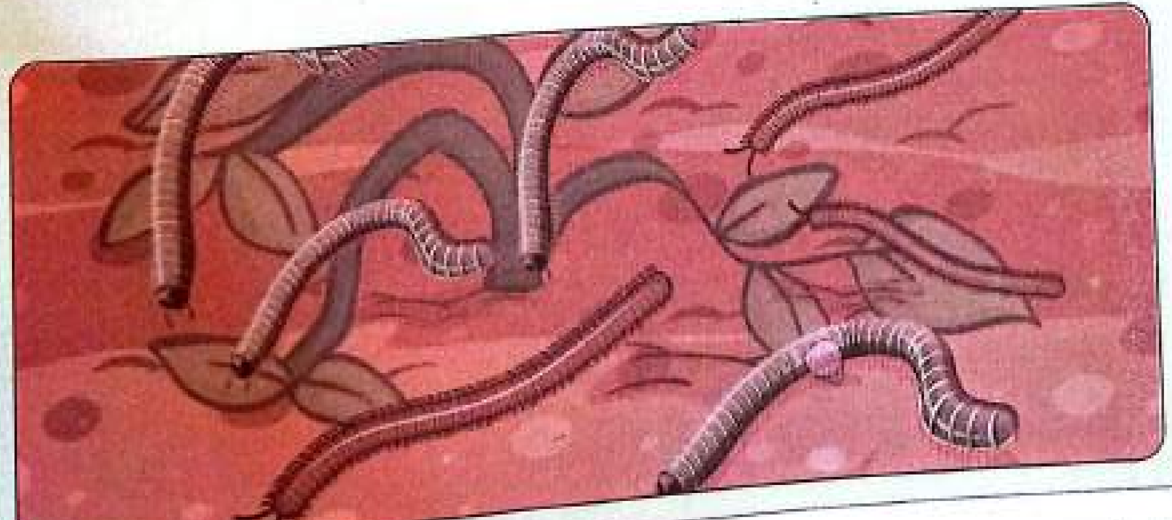
1. Recycling nutrients back into the ecosystem.
2. Increasing the soil fertility.

① تعيد الكائنات المُحَلِّلة تدوير العناصر الغذائية مرة أخرى إلى النظام البيئي. ② تزيد من خصوبة التربة.

Note:

» Earthworms and millipedes feed on dead plant remains, and they produce waste rich in nutrients that increase the soil fertility.

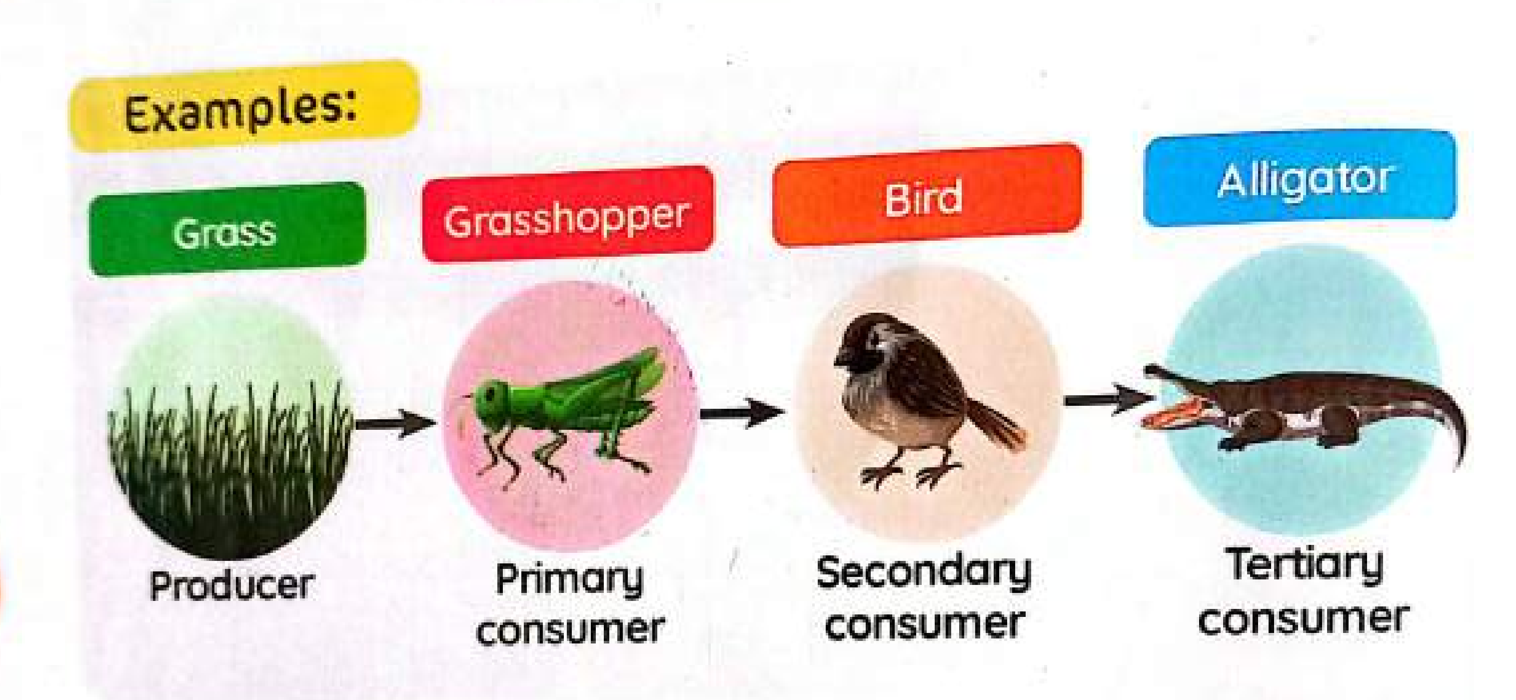
• دودة الأرض والديدان ألفية الأرجل تتغذى بشكل رئيسي على بقايا النباتات الميتة، كما أن الفضلات التي تخرجها غنية بالعناصر الغذائية التي تزيد خصوبة التربة.



» In an ecosystem, energy flows among living organisms, which can be represented by a food chain.

في النظام البيئي تنتقل الطاقة بين الكائنات الحية فيما يعرف بالسلسلة الغذائية.

Food chain • It is a model that shows a linear set of feeding relationships and the movement of energy among living organisms.



From the previous food chain, we observe that:

The first link in the food chain	are	producers.
The second link in the food chain	are	primary consumers.
The third link in the food chain	are	tertiary consumers.
The final link in the food chain	are	decomposers.




Activity 6 Energy Flow

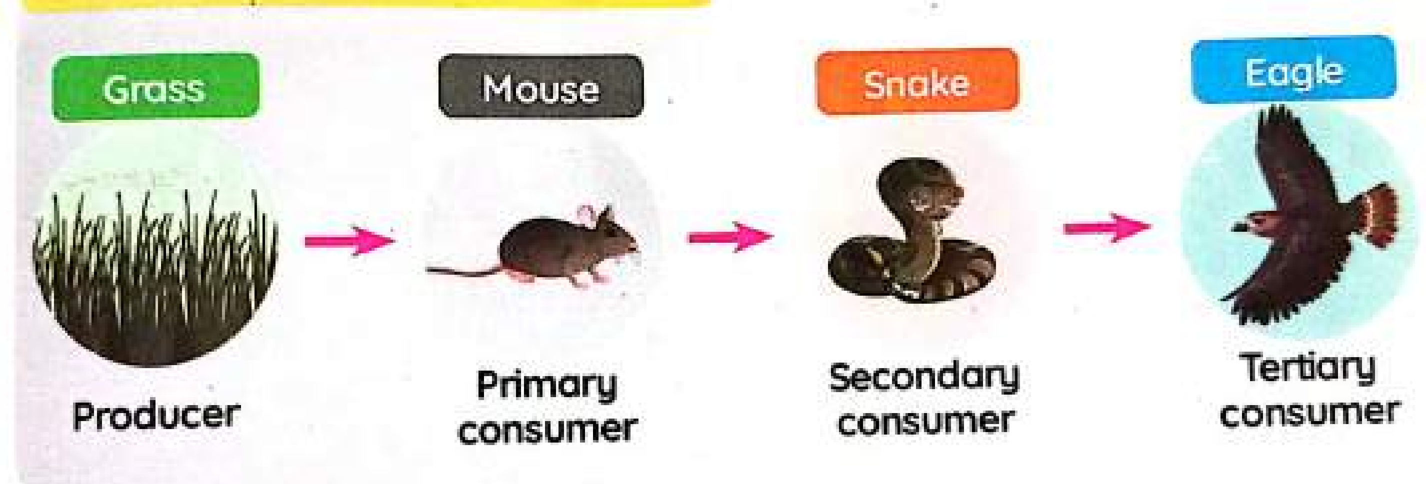
» You have learned that,

- Green plants can get the needed energy directly from the Sun.
- Animals depend on other living organisms to get the energy they need.

Food chains explain:

1. The transfer of energy from one living organism to another.
2. The food relationships among organisms in specific ecosystems.

Example of a food chain:



» Grass makes its own food using energy from sunlight.



» The mouse eats the grass to get energy.



» The snake eats the mouse to get energy.



» The eagle eats the snake to get energy.

From the previous food chain, we find that:

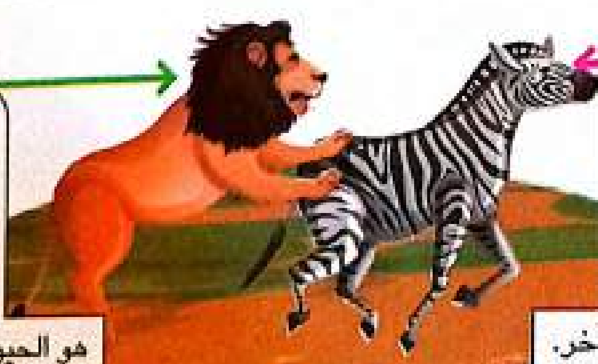
- The energy from the Sun passes to the grass then to the mouse, then to the snake, and finally to the eagle.
- The grass was able to make its own food from the Sun.
- Other animals could not make their own food.

بملاحظتنا للسلسلة الغذائية السابقة نجد أن:

- طاقة الشمس انتقلت من العشب إلى الفأر ثم الأفعى وأخيرًا إلى النسر.
- استطاع العشب صناعة غذائه بنفسه عن طريق الشمس.
- لم تستطع باقي الحيوانات صنع غذائها بنفسها.

1. The mouse is a prey. Because the snake eats it.
2. The snake is a predator or prey. Because it eats the mouse or the hawk eats it.
3. The eagle is a predator. Because it eats the snake.

From the previous, we can conclude that:



Predator is the animal that eats (hunts) another animal.

هو الحيوان الذي يتغذى على حيوان آخر.

Prey is the animal that is eaten (hunted) by another animal.

هو الحيوان الذي يتغذى عليه حيوان آخر.

Notes:

- One predator may depend on many different types of prey.
- Both predators and prey pass food and energy through the food chain.

- قد يعتمد أحد الحيوانات المفترسة على العديد من الأنواع المختلفة من الفرائس.
- ينتقل الغذاء والطاقة في السلسلة الغذائية عن طريق كل من الحيوانات المفترسة والفرائس.

Choose the correct answer:

1 .... are/is the main source of energy for all living organisms on the Earth.
a. Plants b. The Sun c. The moon d. Humans

2 Green plants need .... energy from the Sun to manufacture glucose.
a. heat b. chemical c. light d. kinetic

3 Humans need to exert more energy during ....
a. thinking b. sleeping c. doing exercises d. breathing

4 Humans can get energy from the ....
a. digestion process only b. respiration process only
c. photosynthesis process only d. a and b

5 Which of the following materials is available in the air for the photosynthesis process?
a. Oxygen gas b. Carbon dioxide gas
c. Hydrogen gas d. Nitrogen gas

6 The main place of the photosynthesis process is the ....
a. leaf b. root c. stem d. flower

7 .... can make its/their own food.
a. Bactria b. Grass c. Birds d. Insects

8 Living organisms are classified according to the way they .... into producers, consumers, and decomposers.
a. move b. breathe c. adapt d. feed

9 Which of the following organisms depends on other organisms to get energy?
a. Grass b. Mice c. Flower d. Carrot

10 The .... are considered decomposers in the ecosystem.
a. honeybees b. locusts c. insects d. fungi

11 All the following are considered consumers, except ....
a. birds b. locusts c. pine trees d. rabbits

12 Any food chain starts with ....
a. humans b. animals c. plants d. birds

13 In a food chain, the primary consumer may be ....

a. a predator only b. a prey only c. a plant d. a and b

14 Decomposers can get their energy from the ....

a. Sun b. plants

c. animals d. dead organisms

15 Decomposers always .... the soil.

a. pollute b. damage c. benefit d. harm

16 The relationship between .... is a "predator and prey" relationship.

a. rabbits and carrots b. mice and grass

c. hawks and fungi d. eagles and snakes

17 .... depend directly on green plants to get the energy.

a. Decomposers b. Primary consumers

c. Secondary consumers d. Tertiary consumers

18 .... are the final link in the food chain.

a. Decomposers b. Primary consumers

c. Secondary consumers d. Tertiary consumers

19 Many insects are considered ....

a. decomposers b. primary consumers

c. tertiary consumers d. producers

20 Which of the following statements is correct about "secondary consumers"?

a. They eat producers.

b. They are eaten by primary consumers.

c. They are eaten by tertiary consumers.

d. They eat decomposers.

21 Which of the following food chains is correct?

a. Hawk → snake → frog → locust → grass

b. Grass → frog → snake → locust → hawk

c. Grass → locust → frog → snake → hawk

d. Hawk → snake → locust → frog → grass

22 When a snake eats a rabbit that feeds on grass, the rabbit is considered a ....

a. primary consumer b. secondary consumer

c. tertiary consumer d. primary decomposer

2 Put (✓) or (✗):

1. The energy of the Sun can reach the bodies of different living organisms. ( )
2. Breathing doesn't require energy. ( )
3. Your body stops using energy when you are sleeping. ( )
4. Producers and consumers are different in their ways of feeding. ( )
5. The Sun is the first link in the food chain. ( )
6. Green plants depend on other organisms to get energy. ( )
7. Decomposers return nutrients from the soil to dead organisms. ( )
8. Without decomposers, the Earth would be full of dead bodies. ( )
9. Animals can be classified into consumers and producers. ( )
10. Producers can benefit from decomposers. ( )
11. Some animals are considered predators or preys at the same time. ( )
12. Energy doesn't flow between two consumers at the beginning of the food chain. ( )

3 Write the scientific term:

1. A kind of sugar produced through the photosynthesis process. (..........)
2. A vital process that provides plants with glucose. (..........)
3. The primary source of energy for all living organisms. (..........)
4. It's a gas that is necessary for the respiration process for all living organisms. (..........)
5. It's a gas that is necessary for the photosynthesis process. (..........)
6. It's a model that shows a linear food relationship among living organisms. (..........)
7. Living organisms that are able to produce their own food. (..........)
8. A structure inside a plant where the photosynthesis takes place. (..........)
9. Living organisms that eat green plants (photosynthetic organisms). (..........)
10. Living organisms that feed on secondary consumers. (..........)
11. They're the final link in the food chain. (..........)
12. They are animals that eat other animals. (..........)
13. They are animals that are eaten by other animals for food. (..........)
14. It's the process of recycling nutrients back to the soil. (..........)

4 Complete the following sentences:

1. Living organisms are classified into .... groups according to their ways of getting food.
2. In an ecosystem, ... is transferred among living organisms.
3. Plants are able to produce their own food in the form of .... that is rich in energy.
4. Most insects are considered .... consumers.
5. .... and .... are two examples of decomposers that get energy from ....
6. Animals and humans are ...., while .... are the producers on Earth.
7. A snake is a predator when it eats ...., while it is considered prey when it is eaten by ....
8. Any food chain starts with .... and ends with ....

5 Cross out the odd word:

1. Cows – Palm tree – Pine – Grass (........)
2. Breathing – Sleeping – Thinking – Physical exercises (........)
3. Humans – Animals – Birds – Plants (........)
4. Grass – Insects – Pine – Vine (........)
5. Insects – Alligators – Worms – Birds (........)
6. Bacteria – Locusts – Millipedes – Fungi (........)

6 Classify the following words in the tables below:

1. Rabbit – Grass – Hawk – Trees – Worm – Frog – Bactria – Alligator

Producers	Consumers	Decomposers
....	....	....

2. Frogs – Cows – Apple tree – Birds – Fish – Grass – Lions

Organisms that make their own food	Organisms that can't make their own food
....	....
....	....

7 Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1 Glucose	a. is a gas that is used to manufacture the plant's food.
2 Oxygen gas	b. is a basic need for all living organisms.
3 Carbon dioxide gas	c. Is the gas released from the photosynthesis.
4 Water	d. provides green plants with energy.

1 .... 2 .... 3 .... 4 ....

8 Study the following figures, then put (✓) or (✗):

(1)	(2)	(3)	(4)

1. Organism number (1) is the main source of energy for all organisms. (   )
2. Organism number (1) depends on organism number (3) to get energy. (   )
3. Organism number (4) is eaten by organism number (2). (   )

9 Arrange the following living organisms to obtain a correct food chain:

1. Human - grass - chicken

.... → .... → ....

2. Snake - carrot - eagle - rabbit - fungi

.... → .... → .... → .... → ....

3. Duck - grass - fox - bacteria

.... → .... → .... → ....

4. Giraffe - lion - fungi - acacia tree

.... → .... → .... → ....

5. Flies - frog - hawk - flowers

.... → .... → .... → ....

10 The following figure represents a food chain, use the words below to complete the sentences:

(decomposers - predator only - prey only - predator and prey together - producer - grow - decompose)

1. The snake is considered a ...., while the grass is considered a ....
2. The hawk is considered a ...., while the mouse is considered a ....
3. When the hawks die, their bodies .... because .... feed on them.
4. Grass need sunlight to survive and ....

11 Give reasons for:

1. Humans and plants are different in their ways of getting energy.
   ....
2. The Sun is very important for all living organisms.
   ....
3. Green plants are classified as producers.
   ....
4. Decomposers play an important role in all ecosystems.
   ....
5. Animals and humans are classified as consumers.
   ....

12 What happens if:

1. The Sun disappears?
   ....
2. Decomposers disappear from an ecosystem?
   ....



Lesson 3



Activity 7 Food Chain

» Now, let's make a model of a food chain.

Bird



Grass



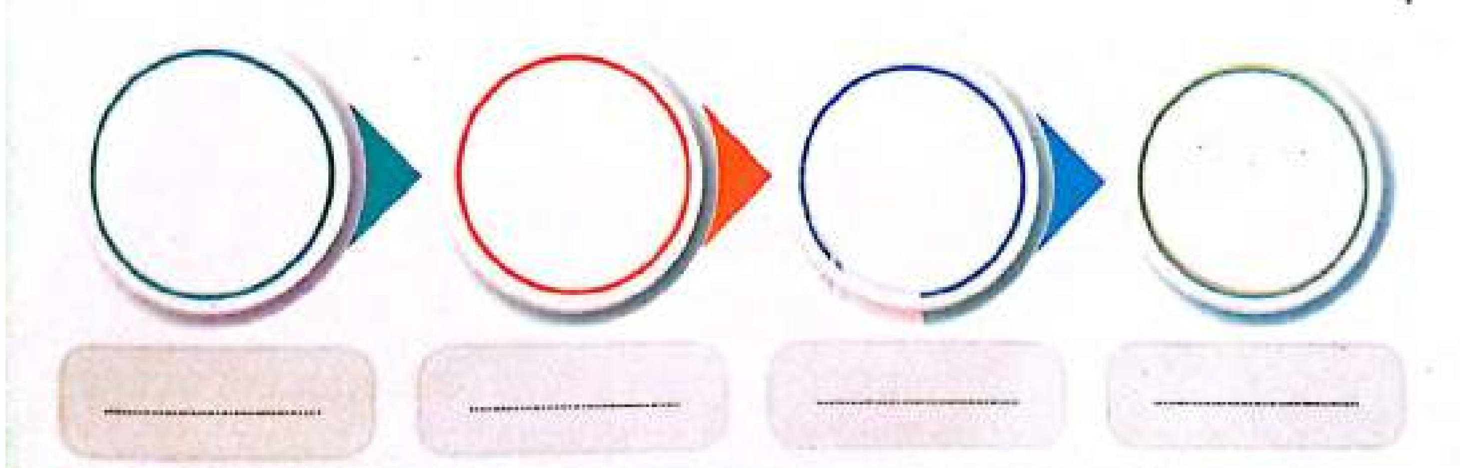
Grasshopper



Snake



1 Complete the following food chain model using the previous organisms, then mention the role of each one in the food chain:



2 From the previous designed food chain, complete using the following words:

(predator - prey - producer - predator and prey)

1. The snake is considered a ....
2. The grasshopper is considered a ....
3. The bird is considered a ....
4. The grass is considered a ....

Unit 1

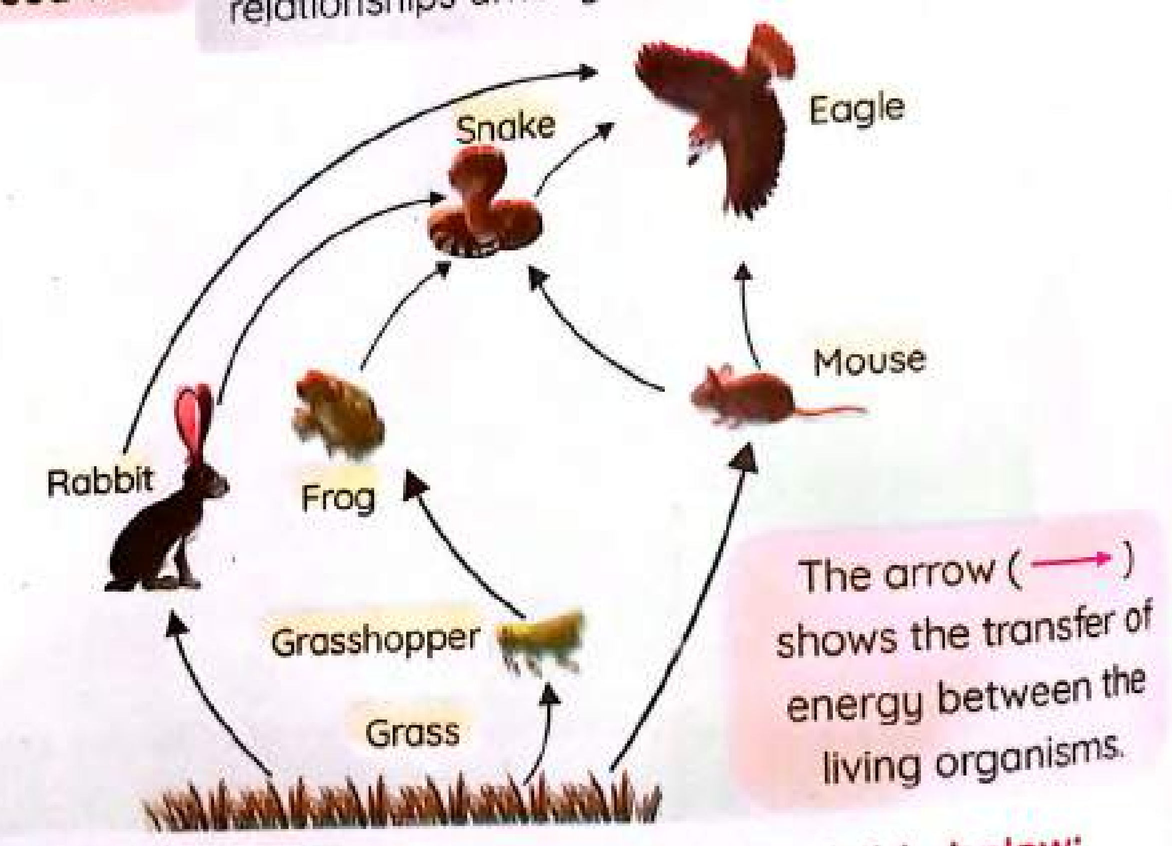


Activity 8 Food Webs

- Most organisms are part of several food chains.
- A **food web** is made up of several interconnected **food chains**.
- All living things, including you, interact in food webs.

• معظم الكائنات الحية جزء من العديد من السلاسل الغذائية المختلفة.
• تتقاطع سلاسل الغذاء داخل النظام البيئي لتشكيل الشبكة الغذائية.
• جميع الكائنات الحية بما فيها الإنسان تتفاعل معًا داخل الشبكات الغذائية.

Food web: It is a model that shows many different feeding relationships among living organisms.



The arrow (⟶) shows the transfer of energy between the living organisms.

Classify the following organisms in the table below:

(Mouse - Grass - Rabbit - Eagle)

Producers	Consumers	
	Predators	Prey
....	....	....
....	....	....




Activity 9 Interactions in Food Webs

Concept 2

Complete using the words below:

(food chain - food web - consumers - Sun - predators - prey)

1. A .... is a model that shows many different feeding relationships in ecosystem.
2. Producers get energy from the ......, then they become food for ....
3. ...... is the consumer that is eaten by ....
4. A ...... is a model that shows a linear feeding relationship in an ecosystem.

Give a reason for...

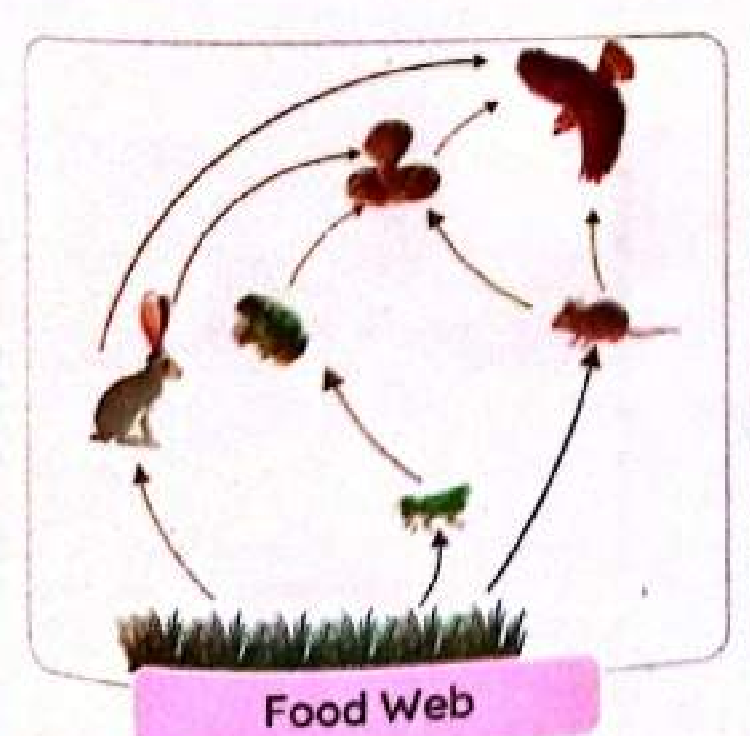


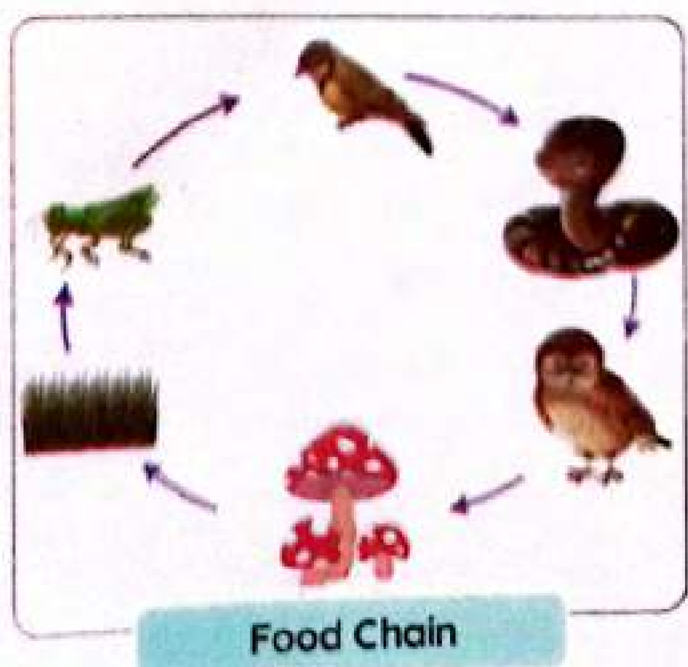
- A food web is better than a food chain to show the interaction among organisms.

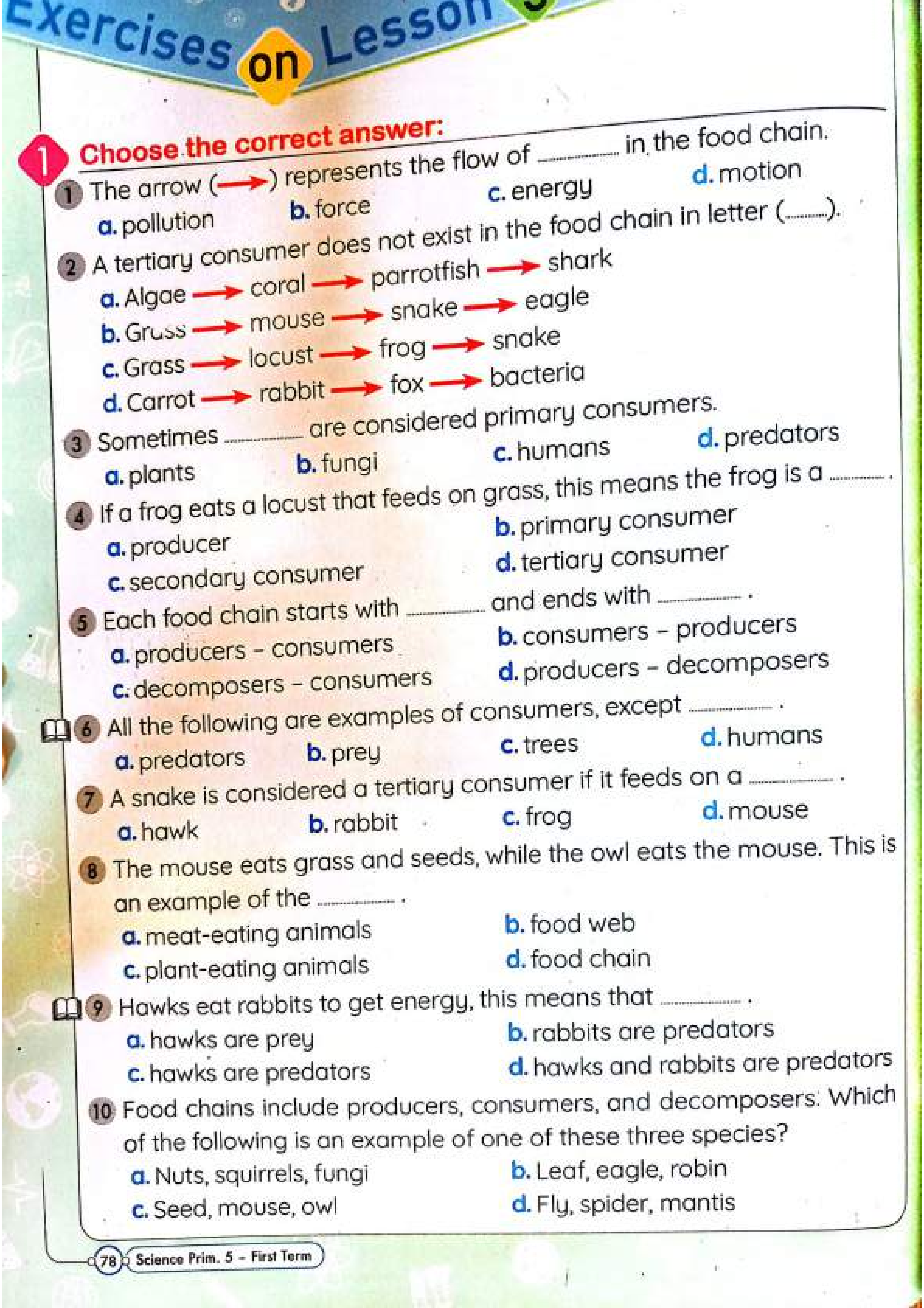
Because a food web shows many food relationships in an ecosystem, while a food chain shows few food relationships.

توضح الشبكة الغذائية العلاقات الغذائية بين الكائنات الحية بشكل أفضل من السلسلة الغذائية.

لأن الشبكة الغذائية توضح العديد من العلاقات الغذائية في النظام البيئي على عكس السلسلة الغذائية التي توضح القليل من العلاقات الغذائية.


Food Web


Food Chain



Exercises on Lesson

1 Choose the correct answer:

1. The arrow (→) represents the flow of .... in the food chain.
   a. pollution b. force c. energy d. motion
2. A tertiary consumer does not exist in the food chain in letter (........).
   a. Algae → coral → parrotfish → shark
   b. Grass → mouse → snake → eagle
   c. Grass → locust → frog → snake
   d. Carrot → rabbit → fox → bacteria
3. Sometimes .... are considered primary consumers.
   a. plants b. fungi c. humans d. predators
4. If a frog eats a locust that feeds on grass, this means the frog is a ....
   a. producer b. primary consumer
   c. secondary consumer d. tertiary consumer
5. Each food chain starts with .... and ends with ....
   a. producers – consumers b. consumers – producers
   c. decomposers – consumers d. producers – decomposers
6. All the following are examples of consumers, except ....
   a. predators b. prey c. trees d. humans
7. A snake is considered a tertiary consumer if it feeds on a ....
   a. hawk b. rabbit c. frog d. mouse
8. The mouse eats grass and seeds, while the owl eats the mouse. This is an example of the ....
   a. meat-eating animals b. food web
   c. plant-eating animals d. food chain
9. Hawks eat rabbits to get energy, this means that ....
   a. hawks are prey b. rabbits are predators
   c. hawks are predators d. hawks and rabbits are predators
10. Food chains include producers, consumers, and decomposers. Which of the following is an example of one of these three species?
   a. Nuts, squirrels, fungi b. Leaf, eagle, robin
   c. Seed, mouse, owl d. Fly, spider, mantis

11 All types of plants are similar in all the following characters, except that ....

a. they are eaten by primary consumers

b. they are able to make the photosynthesis process

c. they live in different types of ecosystems

d. they can feed on predators

12 If there are no rabbits in an ecosystem, grass will ....

a. increase b. decrease c. not be affected d. die

13 Primary consumers may die if .... disappear.

a. decomposers b. producers c. other consumers d. humans

14 In a food chain, energy transfers directly from ....

a. eagles to mice b. grass to hawks

c. snakes to owls d. rabbits to seeds

15 Nutrients released by decomposers can benefit .... directly.

a. plants b. animals c. humans d. birds

16 If decomposers disappeared completely from an ecosystem, dead things would ....

a. disappear b. decrease c. build up d. decompose

Put (✓) or (✗):

1 Humans feed on producers or primary consumers. ( )

2 We must know the food of each living organism to make a food web. ( )

3 In the food chain, energy may transfer from producers to decomposers and vice versa. ( )

4 Primary consumers get their energy directly from producers. ( )

5 The food web consists of many interconnected food chains. ( )

6 Grasshoppers may disappear completely by the disappearance of grass. ( )

7 Sometimes insects act as predators in the food chain. ( )

8 Some consumers in the food web play different roles. ( )

9 When a snake eats a rabbit, the snake is considered a tertiary consumer. ( )

10. Primary consumers are the second link in the food chain. ( )
11. Decomposed remains of animals and plants become part of the soil. ( )
12. The soil fertility decreases as decomposers consume dead organisms. ( )

Write the scientific term:

1. It is a model that shows many different feeding relationships in an ecosystem. (..................)
2. It's a material that is released by decomposers to be used again by producers. (..................)

Study the following food web, then choose the correct answer:

a. Letter (......) represents the producer. (A – E)

b. Letter (B) represents a .... consumer. (primary – secondary)

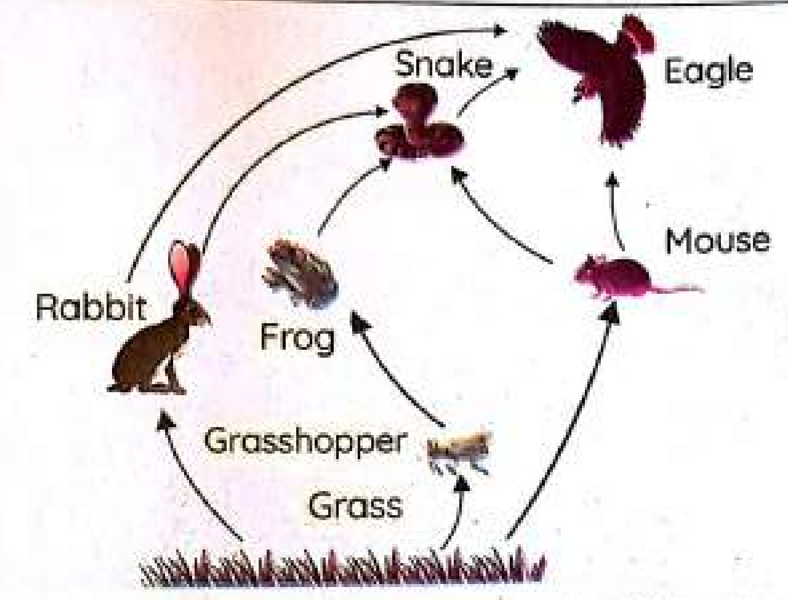
c. Letter (C) is a tertiary consumer when it feeds on letter (.....). (B – D)

Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1. Respiration	a. Grass → rabbit → snake → eagle
2. Photosynthesis	b. Dead organisms → nutrients
3. Decomposition	c. Oxygen gas (in) → carbon dioxide gas (out)
4. Food web	d. Sunlight + carbon dioxide + water → glucose + oxygen gas
5. Food chain	e. Grass → rabbit → snake; rabbit → eagle

1. .... 2. .... 3. .... 4. .... 5. ....

Study the following food web, then answer the questions below:



1 From the previous food web, complete the following spaces to form three food chains:

a. .... → .... → ....

b. .... → .... → .... → ....

c. .... → .... → .... → .... → ....

2 Choose the correct answer:

a. The number of primary consumers is .... living organisms. (two – three)

b. .... use(s) the energy of the Sun to produce its/their own food. (Grass – Eagles)

c. The eagle is considered a tertiary consumer when eating the .... (mouse – snake)

d. The .... may be a predator or prey at the same time. (rabbit – snake)

Study the following food web, then choose the correct answer if you know that (A) represents the decomposer:

B → C → D
B → A, C → A, D → A

a. The .... consumer doesn't exist. (secondary – tertiary)

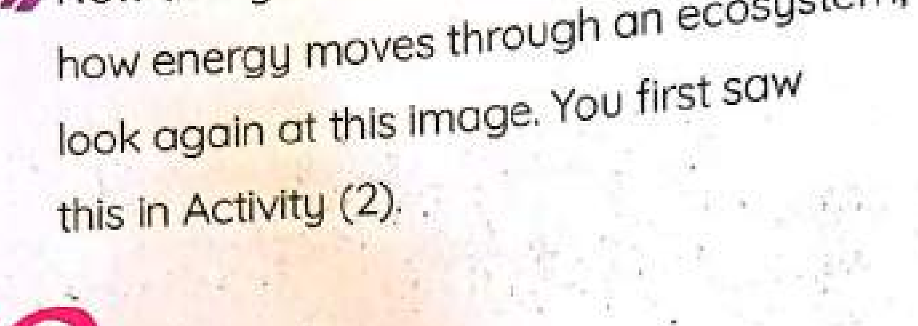
b. .... can make its own food. (A – B – C – D)

c. .... increases soil fertility. (A – B – C – D)

d. A rabbit may take the role of letter .... (A – B – C – D)



Activity 10 Record Evidence Like a Scientist: How Hawks Get Energy



» Now that you have learned about how energy moves through an ecosystem, look again at this image. You first saw this in Activity (2).



Question:

» How can you describe how hawks get energy now?

My Claim:

Evidence:

Scientific Explanation with Reasoning:



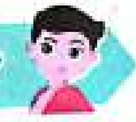
STEM in Action

Activity 11 Plant-Community Ecologist

» In this activity, we will talk about Dr. Becky Barak who is a plant community ecologist.





» Dr. Becky Barak does her researches in natural regions. 

- Due to the presence of plants and animals in natural places.

» She learned about ecology, and took a class in restoration ecology.

- تُجري د. باراك أبحاثها في المناطق الطبيعية لتواجد النباتات والحيوانات.
- قامت بدراسة علم البيئة، ثم التحقت بعد ذلك بأحد الصفوف الدراسية عن الإصلاح البيئي.

Check your understanding?

» Put (✓) or (✗):

1. Dr. Becky Barak does all of her researches inside in a lab. ( )
2. Natural places (prairies) are the best places to study animals and plants. ( )
3. Restoration ecology can be done by a plant community ecologist. ( )

Unit 1

Seed Dispersal

» Dr. Barak has learned that different plants need different ways to disperse their seeds.

1 Sticky Seeds





Their seeds can stick to human clothing or animal fur to be carried to another environment.

بذور لزجة:

قد تلتصق تلك البذور بملابس الإنسان أو بجسم الحيوان؛ ليتم نقلها إلى بيئة أخرى.

2 Light (flying) Seeds



They are dispersed by the wind.

How?

- The seeds are released from the plant when the plant is ready.
- The seeds fly away to new habitats to grow in other places.

بذور خفيفة:

هناك بذور تنتقل بفعل الرياح. كيف؟

- تنتج النباتات هذه البذور عندما يكتمل نموها.
- تتطاير البذور لمسافات بعيدة ثم تستقر وتنمو في بيئات جديدة.

Careers in Ecology

- When you spend time in nature, you find and learn new things.
- **You can share in conservation or restoration work in your area.** 
  To help take care of plants and animals.
- Your interest in nature now could lead to a career in ecology in the future.

- عندما يقضي الإنسان وقتًا في الطبيعة، فإنه يكتشف ويتعلم أشياء جديدة.
- من المهم المشاركة في أعمال الحفاظ أو الإصلاح البيئي في منطقتك للمساعدة في رعاية النباتات والحيوانات.
- قد يؤدي اهتمامك بالطبيعة الآن إلى أن تعمل في مجال علم البيئة في المستقبل.

1 Choose the correct answer:

1. Dr. Becky Barak studies groups of ....
   a. rocks
   b. plants
   c. insects
   d. birds

2. Dr. Barak gets to do her research in ....
   a. labs
   b. hospitals
   c. natural regions
   d. universities

3. The seeds fly away to grow in new habitats, this represents ....
   a. seed dispersal
   b. photosynthesis
   c. respiration
   d. reproduction

4. Humans can be a reason to disperse .... seeds.
   a. light
   b. heavy
   c. smooth
   d. sticky

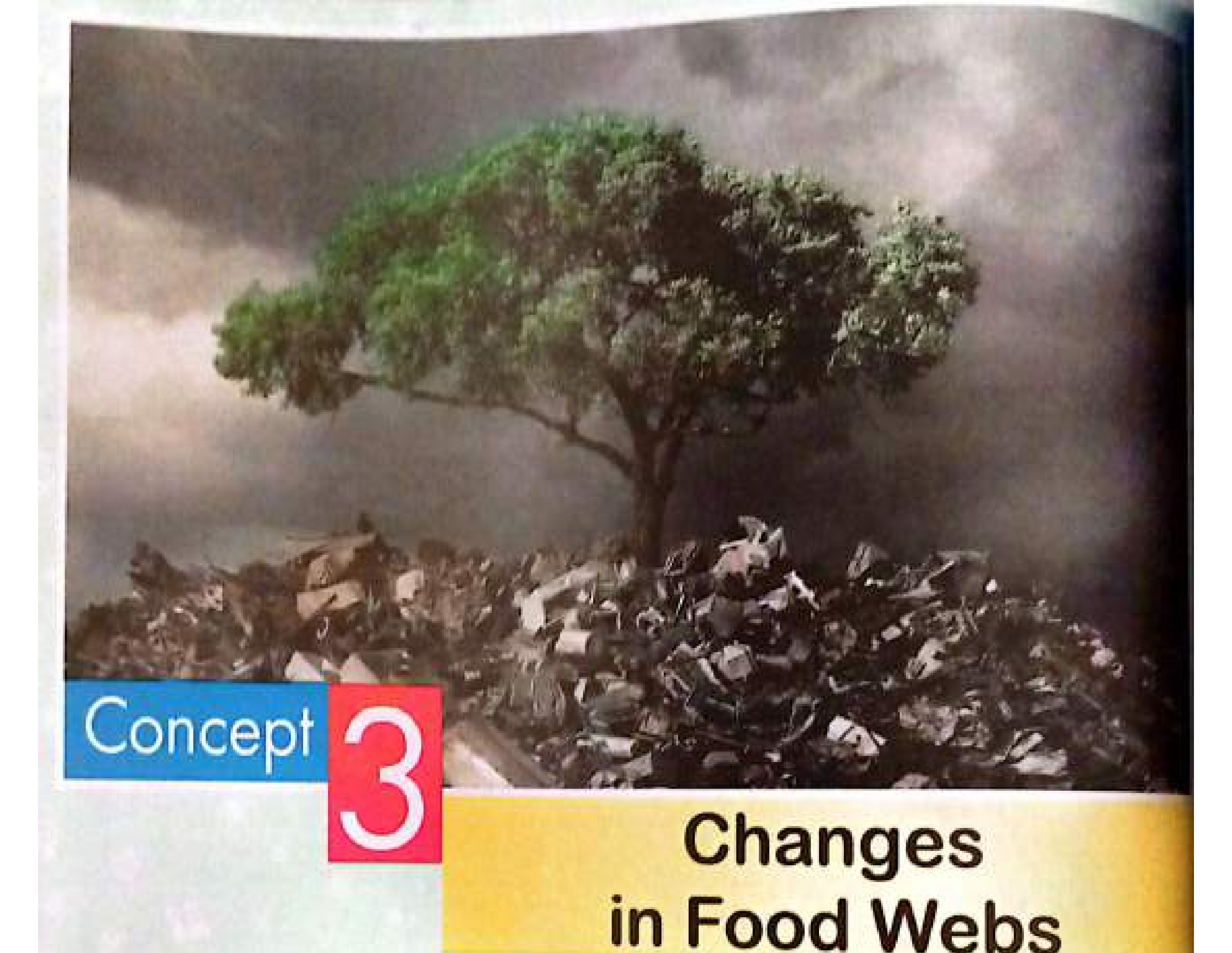
5. .... can disperse light seeds.
   a. Water b. Wind c. Humans d. Animals

2 Put (✓) or (✗):

1. Dr. Becky Barak is a plant-community ecologist. ( )
2. Not all scientists do their researches inside a lab. ( )
3. All seeds have the same structure and disperse in the same way. ( )
4. As the wind blows, light seeds may disperse for a distance. ( )

3 Write the scientific term:

1. The suitable ecosystem for plant-community ecologists to do their researches. (........)
2. It's the process of moving seeds from one place to another. (........)



Concept 3

Changes in Food Webs

Concept Objectives:

By the end of this concept, students will be able to:

- Demonstrate through modeling how changes in an ecosystem can disrupt a food web.
- Construct an explanation about how human activity can negatively impact an ecosystem.
- Argue for possible solutions to environmental problems that can restore the health of an ecosystem.

Key Vocabulary:

- Climate
- Conservation
- Habitat
- Microorganisms
- Microplastics
- Nursery
- Pollution
- Population
- Restoration

Concept 3

Changes in Food Webs

Lesson 1



Unit



Activity 1 Can You Explain?





Observe the opposite figure, then choose the correct answer:

1 Is this a healthy ecosystem?	Yes	No
2 The lake is affected by	drought	pollution
3 The lake dried up due to the .... temperature.	high	low



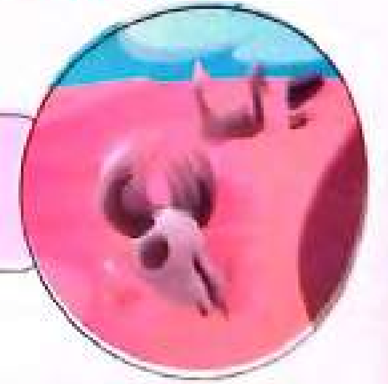


What might happen to a food web when the environment changes



» All organisms in the food web may be affected, for example:

If producers disappear, → consumers will migrate or die.



If the number of one species increases too much, → food resources will run out (disappear).



Lake	بحيرة	Migrate	يهاجر
Drought	جفاف	Run out	ينفذ
Pollution	تلوث	Species	فصائل

Activity 2 Protecting Ecosystems





» Throwing plastic garbage into the sea .... the marine ecosystem.

conserves | harms | improves

» Some human activities may affect marine environments, such as:







1 Overfishing

A human activity that leads to a decrease in the number of fish.

2 Water pollution

A human activity in which humans throw waste materials into water.

3 Introduction of invasive species

• تؤثر الأنشطة البشرية على البيئة المائية من خلال عوامل مختلفة، مثل:

1 الصيد الجائر: نشاط بشري يؤدي إلى انخفاض عدد الأسماك.

2 تلوث المحيطات: نشاط بشري حيث يقوم الإنسان بإلقاء المخلفات في المياه.

3 إدخال أنواع مفترسة من الكائنات الحية في غير أماكنها.

Pollution It's the harm that happens to air, water, or soil by substances that harm living organisms.

Unit 1

Example: Palau Island

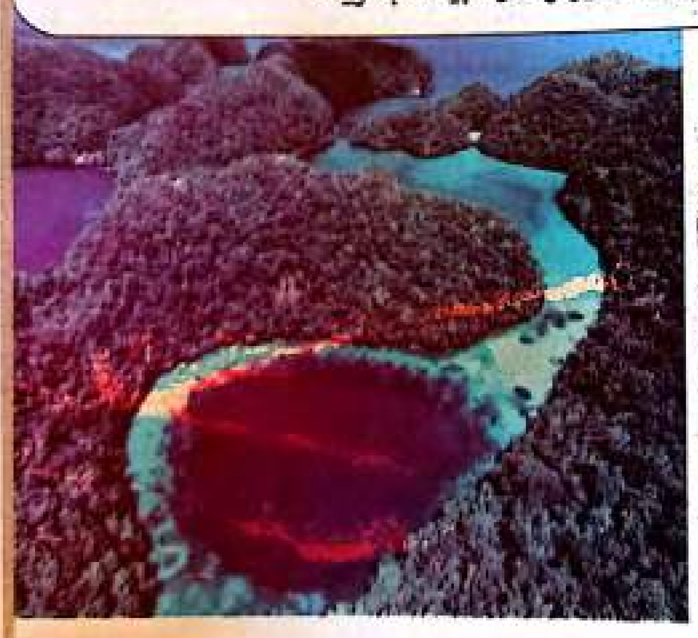


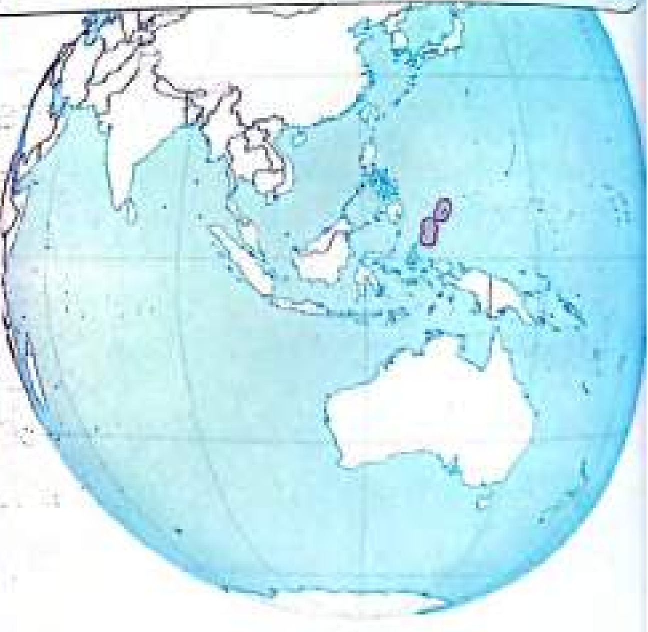
» Palau is an island that uses various conservation programs.
- To protect the marine environment and its resources.
- To create well-designed, protected marine environments in place.

تستخدم جزيرة بالاو برامج الحفاظ على البيئة البحرية.
- لحماية البيئة البحرية ومواردها.
- لإنشاء محميات بحرية جيدة التصميم في مياهها.

On any island, it is impossible to separate what happens on land from what happens in the marine environment because any pollution on the land will affect the water.

في أي جزيرة من المستحيل أن تفصل بين ما يحدث من أنشطة بشرية على اليابسة والبيئة البحرية حيث أن أي تلوث قد يحدث على اليابسة قد يؤثر على البيئة البحرية.







How can Palau Island protect the marine environment



1. Palau manages land activities. G.R
   To control the quality of the marine environment.
2. Palau prevents fishers from overfishing in coral reefs.

كيف تستطيع جزيرة بالاو حماية البيئة البحرية؟
1. تنظم جزيرة بالو الأنشطة البشرية على اليابسة وذلك حتى تتحكم في جودة البيئة البحرية بها.
2. منع الصيادين من الصيد الجائر في منطقة الشعاب المرجانية.



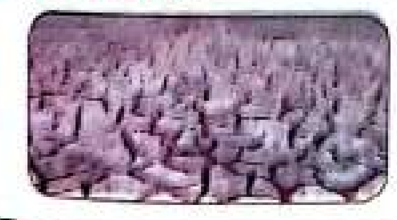


Activity 3 What Do You Already Know About How Food Webs Can Change?

- Relationships between organisms play a large role in balancing an ecosystem.
- When organisms are removed or their role in a community changes, the ecosystem could collapse.

Concept 3

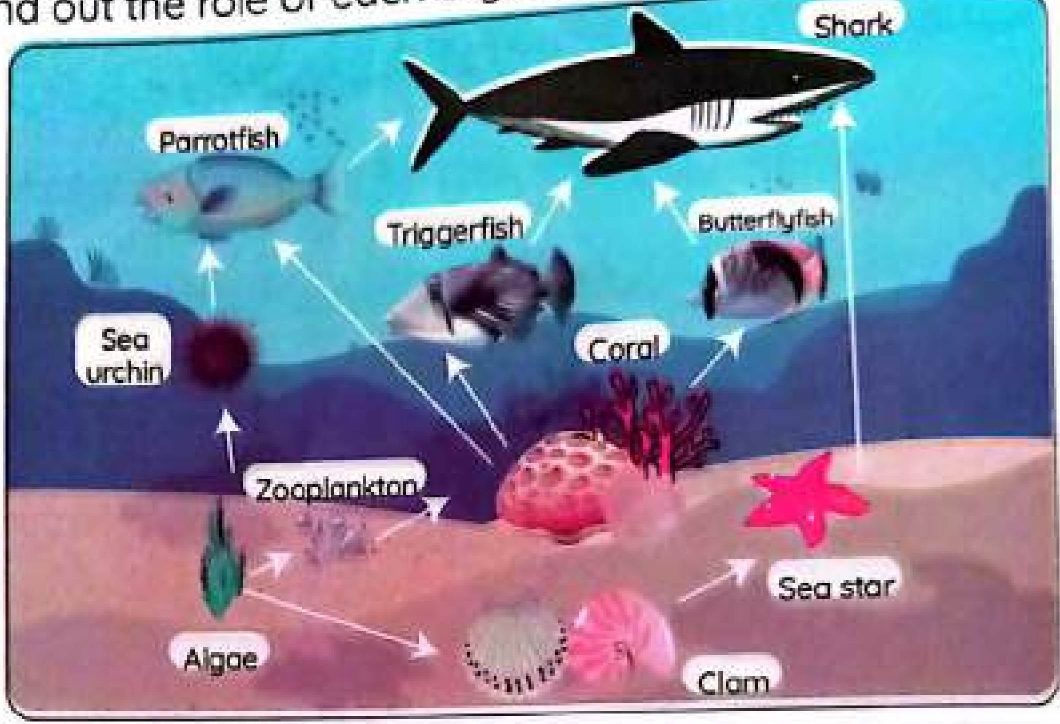


If there is (are)	then	because
1 gentle rain in the desert, 	• the desert ecosystem might improve	• rainwater helps producers to grow. • consumers will feed on producers.
2 heavy rain in the desert, 	• the desert ecosystem might be harmed	• heavy rains lead to floods, which destroy the ecosystem.
3 drought, 	• the ecosystem might collapse	• producers will die. • consumers that depend on producers will die.
4 many top predators in the food web, 	• the food web gets harmed	• predators will eat all other living organisms.

Top Predators: They are consumers that exist at the top of the food chains.
Examples: Eagles, lions, sharks, crocodiles... etc.

Marine Food Webs

» Let's find out the role of each organism in the following food web:



- Algae are producers that produce their own food.

- Zooplankton, clams, and sea urchins are primary consumers that feed on producers.

- The sea star feeds on the clam.
- The coral feeds on zooplanktons.
- The parrotfish feeds on sea urchins or corals.
- Butterflyfish and triggerfish feed on corals.

- The shark is a top predator that eats butterflyfish, parrotfish, and sea stars.

Important Note:

- All food chains in this figure start with algae.

Algae	الطحالب	Parrotfish	السمكة الببغائية	Sea star	نجم البحر
Clam	الرخويات	Trigger fish	سمكة الزناد	Coral	المرجان
Zooplankton	العوالق البحرية	Butterflyfish	سمكة الفراشة	Shark	سمكة القرش
Sea urchin	قنفذ البحر				

» Observe the following food web, then complete these diagrams to make four different food chains.

Parrotfish

Shark

Triggerfish

Butterflyfish

Sea urchin

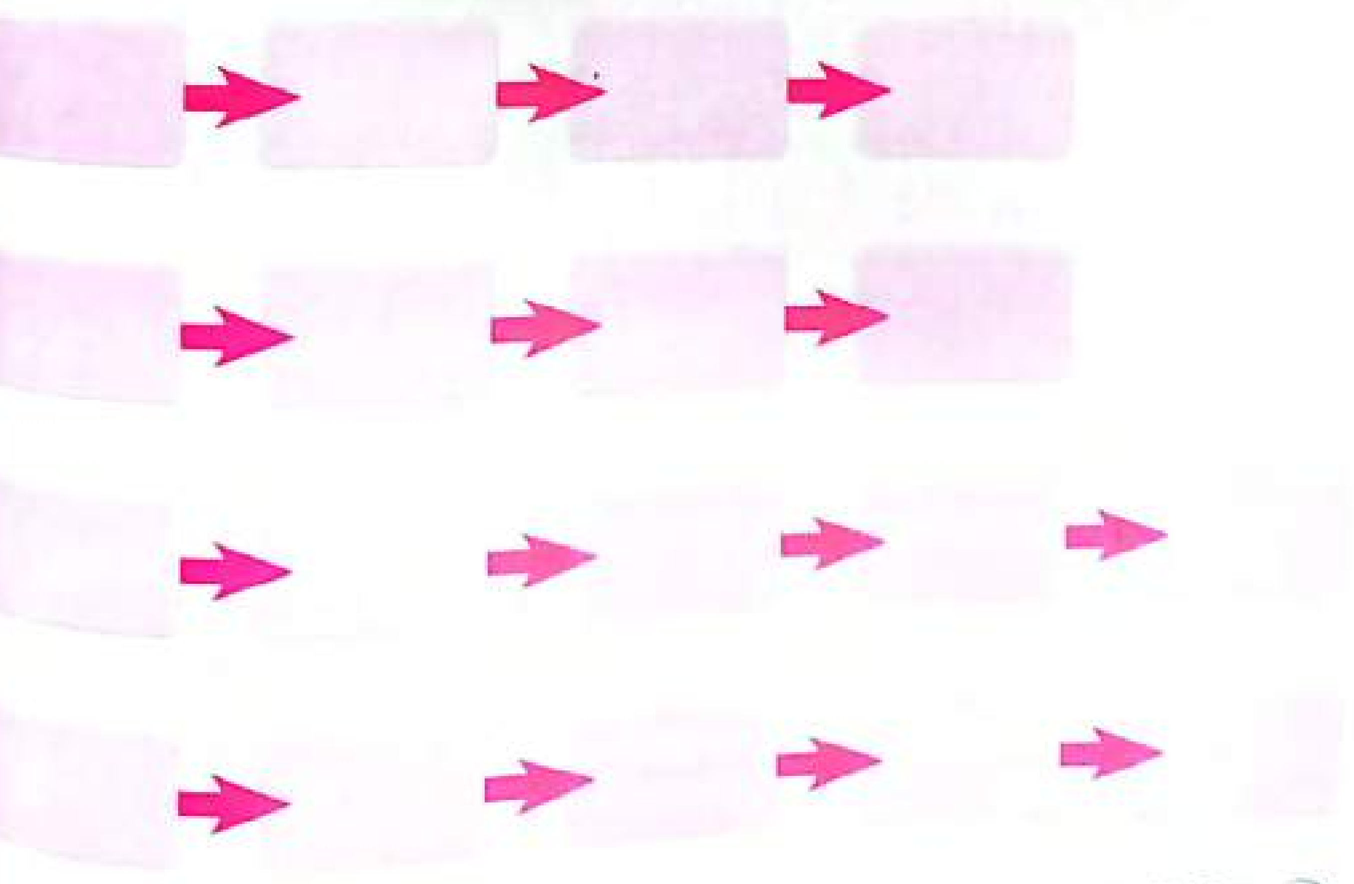
Coral

Zooplankton

Sea star

Algae

Clam



Choose the correct answer:

1 A lake may dry up due to ....

a. extreme cold weather
b. extreme hot weather
c. throwing plastic waste
d. increasing rainfall

2 Desert ecosystems are affected by ....

a. overfishing
b. moonlight
c. rainfall
d. cutting trees

3 Humans impact the marine ecosystem in many ways, such as ....

a. overfishing
b. floods
c. rainfall
d. cutting trees

4 When a predator feeds on a prey, ... transfers between them.

a. water
b. blood
c. force
d. energy

5 A healthy desert ecosystem always requires .... from time to time.

a. floods
b. no rain
c. gentle rain
d. heavy rain

6 Heavy rain may .... the desert ecosystem.

a. benefit
b. improve
c. harm
d. restore

7 Increasing the number of top predators causes a decrease in the number of ....

a. producers
b. consumers
c. decomposers
d. humans

8 Which of the following consumers are considered top predators?

a. Lions and rabbits
b. Hawks and sharks
c. Insects and tigers
d. Frogs and eagles

9 Which of the following are affected by throwing plastic garbage into the sea?

a. Grass and sea stars
b. Deer and sharks
c. Corals and parrotfish
d. Frogs and insects

10 .... is one of the ways that helps to conserve the marine environment surrounding the Palau Island.

a. Severe climate change
b. Dumping plastic into the sea
c. Throwing plastic on land
d. Avoiding overfishing

11 The desert food web usually starts with ...., while the marine food web usually starts with ....

a. grass – corals
b. algae – grass
c. grass – algae
d. trees – zooplanktons

12 All the following are considered primary consumers in the marine food web, except ....

a. sea urchins
b. corals
c. clams
d. zooplanktons

13 Corals can feed on .... to get energy to survive.

a. zooplanktons
b. algae
c. clams
d. sea urchins

14 Which of the following represents the correct marine food chain?

a. Algae → coral → parrotfish → shark
b. Algae → clam → triggerfish → shark
c. Algae → sea urchin → parrotfish → shark
d. Algae → zooplankton → butterfly fish → shark

15 To control the quality of the marine ecosystem near the island, we can ....

a. throw plastics on the island only
b. dump plastics in the water only
c. burn plastic to get rid of it
d. recycle and reuse plastics

2 Put (✓) or (✗):

1 Avoiding overfishing may improve the marine food web. ( )

2 The desert ecosystem gets better if there is heavy rain for a long time. ( )

3 Food resources are not affected by increasing or decreasing consumers. ( )

4 What happens on land doesn't affect what happens in the marine environment. ( )

5 The number of prey increases by increasing the number of predators. ( )

6 Algae are considered the producers in most marine ecosystems. ( )

7 Consumers may migrate in some conditions, such as drought. ( )

Concept 3

8 Top predators are the final link in the food chain. ( )

9 Climate change may destroy a healthy ecosystem. ( )

10 A food web can describe the relationship between living organisms and nonliving things. ( )

3 Write the scientific term:

1 It's the harm that happens to air, water, and soil by substances that harm living organisms. (..........)

2 It's a human activity that reduces the number of fish. (..........)

3 It's a land that is surrounded by water from all directions. (..........)

4 They are consumers that exist at the top of the food chain. (..........)

5 It's an example of producers in the desert ecosystem. (..........)

6 It's an example of producers in the marine ecosystem. (..........)

4 Complete the following sentences using the words between the brackets:

(destroys - increases - drought - decreases - benefits - run out)

1 As the number of predators ...., the number of prey decreases.

2 Gentle rain .... a desert ecosystem, while heavy rain .... it.

3 Overfishing .... the number of fish in the marine ecosystem.

4 Food resources may .... if the number of one species increases.

5 Hot extreme weather may cause .... of some lakes.

5 Cross out the odd word:

1 Parrotfish - Shark - Snake - Coral (..........)

2 Grass - Rabbit - Tree - Algae (..........)

3 Hawk - Rabbit - Algae - Snake (..........)

4 Overfishing - Cutting trees - Plastic pollution - Destroying coral reefs (..........)

6 Rearrange the following organisms to make a correct food chain:

1 Shark - clam - algae - sea star

.... → .... → .... → ....

2 Parrotfish - algae - shark - sea urchin

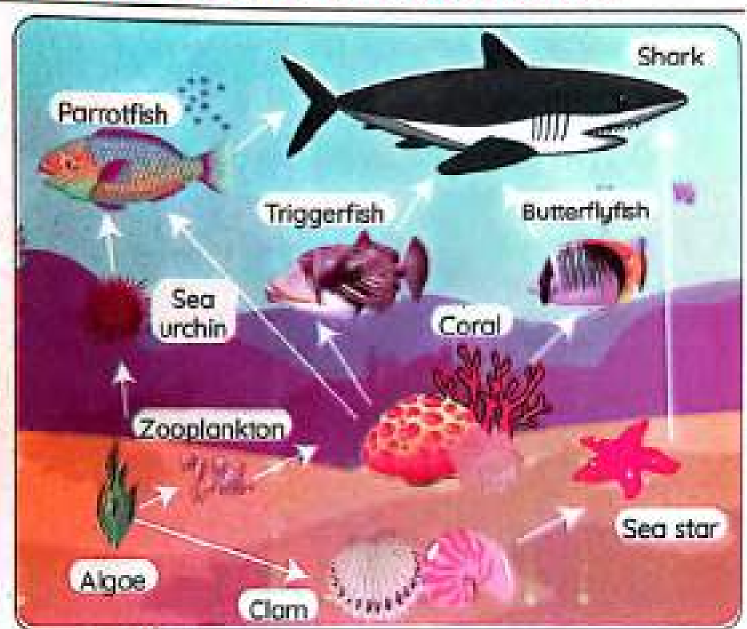
.... → .... → .... → ....

7 Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1 Gentle rain	a. causes the grass to grow in the desert.
2 Heavy rain	b. has a bad impact on the marine ecosystem.
3 Overfishing	c. causes the death of grass in the desert.

1 .... 2 .... 3 ....

8 Study the following figure, then choose the correct answer:



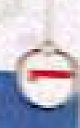
1. The figure represents a .... (food chain – food web)
2. .... are the producers. (Corals – Algae)
3. Clams and sea urchins are .... consumers. (primary – secondary)
4. If the parrotfish disappears, the number of sea urchins will .... (increase – decrease)
5. The .... is the top predator. (shark – sea star)

9 Give reasons for:

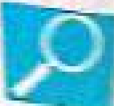
1. Extremely warm climates may harm the desert ecosystem.
2. Gentle rain benefits the desert ecosystem.
3. Heavy rain may destroy the desert ecosystem.
4. Increasing the number of one species may destroy an ecosystem.

10 What happens if:

1. The number of one species increases in an ecosystem (concerning food resources)?
2. The number of predators increases so much (concerning the number of prey)?
3. Gentle rain falls on the desert?
4. Heavy rain falls on the desert?



Lesson 2



Activity  Energy Flow Body Model



Experiment

Energy Flow Body Model

» In this activity, you will design a model for the flow of energy through a food web.

• في هذا النشاط، ستقوم بتصميم نموذج لتدفق الطاقة عبر الشبكة الغذائية.

Tools:

Steps:

1. Ask three of your classmates to play a predator-prey game with you.
2. Assign different roles to your classmates as they choose.
3. Give each one a card labeled with an organism.
4. Start the game as your friend, who represents the prey, gives his card to another one, who represents the predator.
5. Think about the flow of energy in this ecosystem.



Observation:

- There is a transfer of energy between organisms in an ecosystem.

Conclusions:

- The energy in an ecosystem remains the same. Although energy is transferred between living things,
  - Some of the energy transfers among living organisms when they feed on each other.
  - The majority (most) of the energy is recycled back into the ecosystem by decomposers.

تظل الطاقة في النظام البيئي كما هي رغم أن الطاقة تنتقل بين الكائنات الحية:

- بعض الطاقة ينتقل بين الكائنات الحية عندما يتغذى كائن حي على الآخر.
- معظم الطاقة يُعاد تدويره إلى البيئة من خلال الكائنات المُحلِّلة.





Check your understanding?



- Put (✓) or (✗):

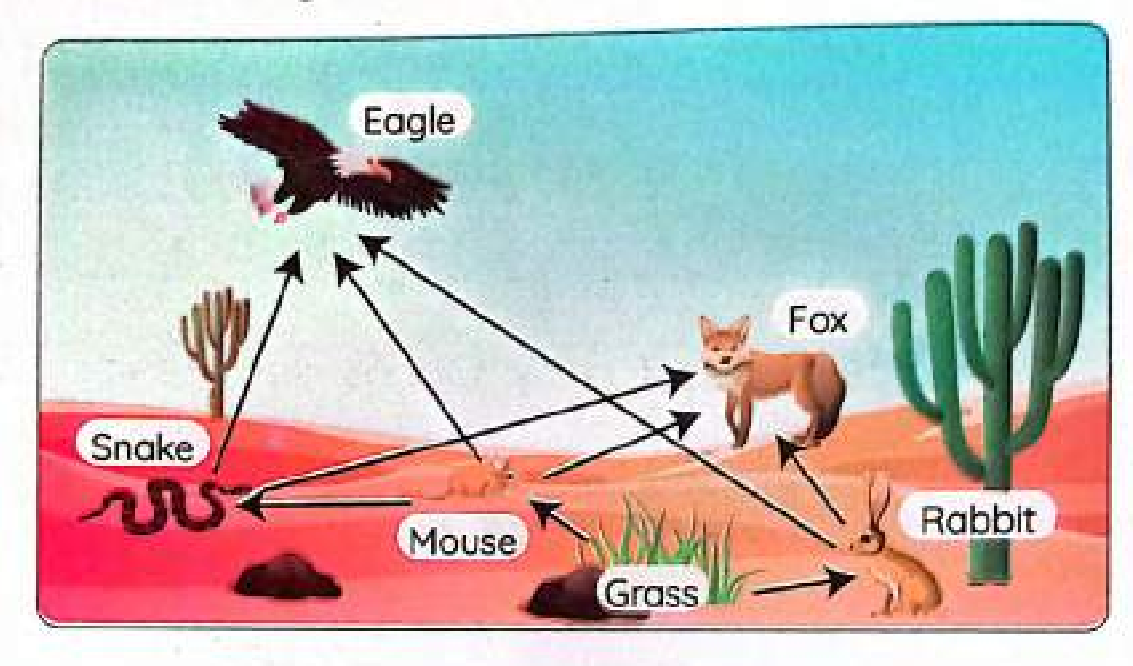
1. A small amount of energy transfers from a predator to prey in the food chain. ( )
2. Energy in an ecosystem decreases by the death of living organisms. ( )
3. Decomposers recycle nutrients found in the dead organisms to the soil. ( )



Activity 5 Desert Food Web

Desert Food Web

» Look at the following desert food web:



What would happen to...



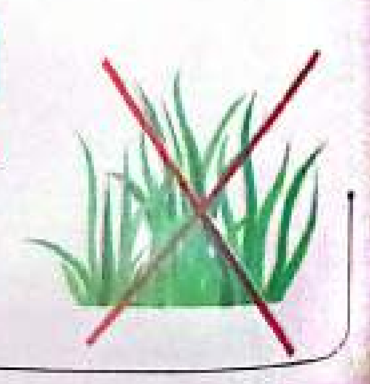
1. **The rabbit if the grass was removed from this area?**
   - The rabbit would die because it can't find any food.

2. **The eagle if the grass was removed from this area?**
   - At the beginning, the eagle wouldn't be affected.
   - Over time, the eagle would be affected when the mouse and the rabbit died due to a lack of food.

If the grass is removed from the ecosystem:

» **Primary consumers** that feed on plants **die quickly**.

» **Other consumers** that feed on primary consumers have less food, so they **may migrate or die**.



Activity 6 Population Changes

Population • It is the number of organisms of one type of species in an area.

مجموعات الكائنات الحية: أعداد نوع واحد من الكائنات الحية التي تعيش في منطقة ما.

Effect of Climate on Population



» The changes in the climate affect the population of a species as follows:

If the climate change is

- **suitable,** the population of the species will increase.
- **unsuitable,** the population of the species will decrease because organisms may die or migrate.

Population change • It means the increase or decrease in the number of one species in an area.

التغير في مجموعات الكائنات الحية:

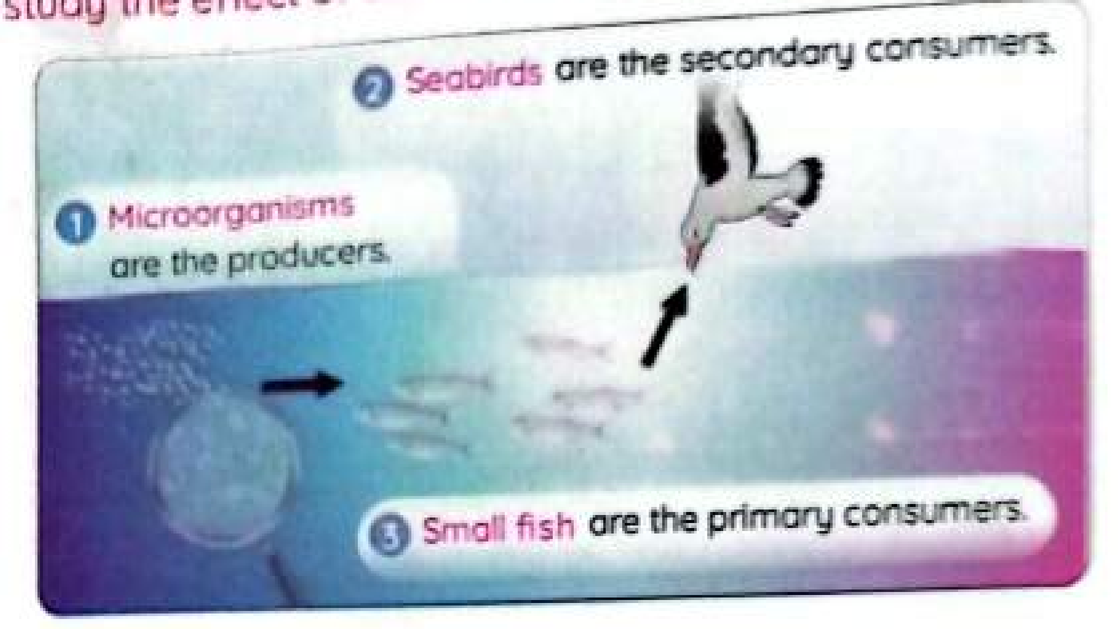
هو النقص أو الزيادة في عدد نوع واحد من الكائنات الحية في منطقة ما.

Note:

- All species depend on other species to survive, so the increase or decrease in one species affects the population of other species.

جميع أنواع الكائنات الحية تعتمد على الأنواع الأخرى للبقاء على قيد الحياة، وبالتالي فإن الزيادة أو النقص في نوع واحد يؤثر على عدد مجموعات الحيوانات الأخرى.

Let's study the effect of climate in the following marine food chain:



① Microorganisms:

- Microorganisms are producers. G.R
  Because they can make their own food.
- Microorganisms are found in cold water habitats. G.R
  Because they need cold water to survive.

② Small fish:

- Small fish are primary consumers. G.R
  Because they feed on microorganisms floating on the water surface.

③ Seabirds:

- Seabirds build their nests on the top of mountain cliffs.
- Seabirds dive deeply in the sea to feed on the small fish.

الكائنات الدقيقة: تعتبر الكائنات الدقيقة من الكائنات المنتجة التي تستطيع صنع غذائها بنفسها.
تعيش الكائنات الدقيقة في المياه الباردة كموطن يساعدها على البقاء.

الأسماك الصغيرة: تعتبر الأسماك الصغيرة كائنات مستهلكة أولية تتغذى على الكائنات الدقيقة التي تطفو على سطح الماء.

الطيور البحرية: تبني الطيور البحرية أعشاشها على قمة المنحدرات الجبلية.
تغوص الطيور البحرية لأسفل لتتغذى على الأسماك الصغيرة.



What will happen if the climate changes and the water becomes warm?

Microorganisms will move towards cooler areas. → **Small fish** will also move to new habitats. → **Seabirds** will have no food, so some may find new habitats, while the others may die.

- Many scientists consider climate change to be the biggest threat to ecosystems.
- The changes in an ecosystem will affect all the populations that live in a community.

- يعتبر العديد من العلماء أن تغير المناخ هو أكبر تهديد للنظم البيئية.
- تؤثر التغيرات في النظام البيئي على جميع الأفراد الذين يعيشون في المجتمع.

Check your understanding?



Read the following sentences, then put (✓) or (✗):

1. Population change may happen due to climate change. (   )
2. Small fish are the main source of energy for seabirds to survive. (   )
3. When the water becomes cold, seabirds try to migrate to warmer regions. (   )
4. Seabirds dive to get small fish that swim near the water surface. (   )
5. Microorganisms can't survive in warm water. (   )

Exercises on Lesson 2

Choose the correct answer:

1. When a predator feeds on a prey, the energy in the ecosystem ....
   a. increases
   b. decreases
   c. disappears
   d. remains constant

2. Although energy is transferred between living things, most of the energy is recycled by .... back into the ecosystem.
   a. predators
   b. prey
   c. decomposers
   d. producers

3. The greatest damage occurs to the desert food web is when .... disappear.
   a. producers
   b. humans
   c. consumers
   d. decomposers

4. Which of the following may be a predator in the food chain?
   a. A primary consumer
   b. A secondary consumer
   c. A tertiary consumer
   d. b and c

5. If the grass is removed from an ecosystem, ... will die first.
   a. primary consumers
   b. secondary consumers
   c. tertiary consumers
   d. decomposers

6. In this food chain (Grass → rabbit → hawk), if the rabbits disappear, the number of .... will increase.
   a. grass
   b. hawks
   c. a and b
   d. no correct answer

7. If the number of primary consumers increases so much, ... will disappear.
   a. producers
   b. decomposers
   c. secondary consumers
   d. tertiary consumers

8. Energy can be transferred between all the following organisms, except ....
   a. prey and predators
   b. primary consumers and predators
   c. decomposers and dead things
   d. producers and predators

9. If climate change is suitable, the population will ....
   a. not be affected
   b. disappear
   c. increase
   d. decrease

10. Small fish can feed on .... that float on the water surface.
   a. sharks
   b. big fish
   c. seabirds
   d. microorganisms
11. Microorganisms can survive in .... water habitats.
   a. polluted
   b. dark
   c. cold
   d. warm
12. .... build their nests on mountain cliffs and dive deeply into the sea to get food.
   a. Owls
   b. Seabirds
   c. Sharks
   d. Sea stars
13. .... is/are considered the producers in the marine food web.
   a. Small fish
   b. Coral reefs
   c. Microorganisms
   d. Grass
14. Increasing the .... causes the migration of microorganisms to another habitat.
   a. air temperature
   b. water temperature
   c. number of seabirds
   d. number of fish

2 Put (✓) or (✗):

1. Energy decreases in ecosystems when the number of top predators increases. ( )
2. The remains of dead organisms bodies contain important elements that ecosystems need. ( )
3. The energy in the ecosystem will not run out because of decomposers. ( )
4. The majority of the energy in the dead prey goes to the predator. ( )
5. If the grass is removed from the desert, rabbits will die quickly. ( )
6. Predators and decomposers get their energy from the prey. ( )
7. Secondary consumers may migrate if the producers are removed from an ecosystem. ( )
8. Increasing the number of primary consumers may make producers disappear. ( )
9. The population of species will decrease when climate change is unsuitable. ( )
10. Microorganisms in the water play the same role as grass in the desert. ( )
11. When the water becomes cold, seabirds have to move to another warmer area. ( )
12. Fish feed on microorganisms found in deep water. ( )

3 Write the scientific term:

1. They're consumers that hunt the prey to get energy to survive. (..................)
2. They're consumers that eat plants to get energy to survive. (..................)
3. They're organisms that recycle energy back into the ecosystem. (..................)
4. It is the number of organisms of one type of species in an area. (..................)
5. It's the increase or decrease in the number of one species in an area. (..................)

4 Complete the following sentences using the words between the brackets:

1. (decrease - increase - some - most - constant - transferred - producers)

   Energy in an ecosystem is ......a......, although it is ......b...... among living organisms, where ......c...... of the energy transfers between living organisms, while ......d...... of the energy in the dead prey are recycled into the ecosystem to ......e...... the soil fertility, so ......f...... grow better.

2. (seabirds - cold - warm - climate change - decomposers - producers)

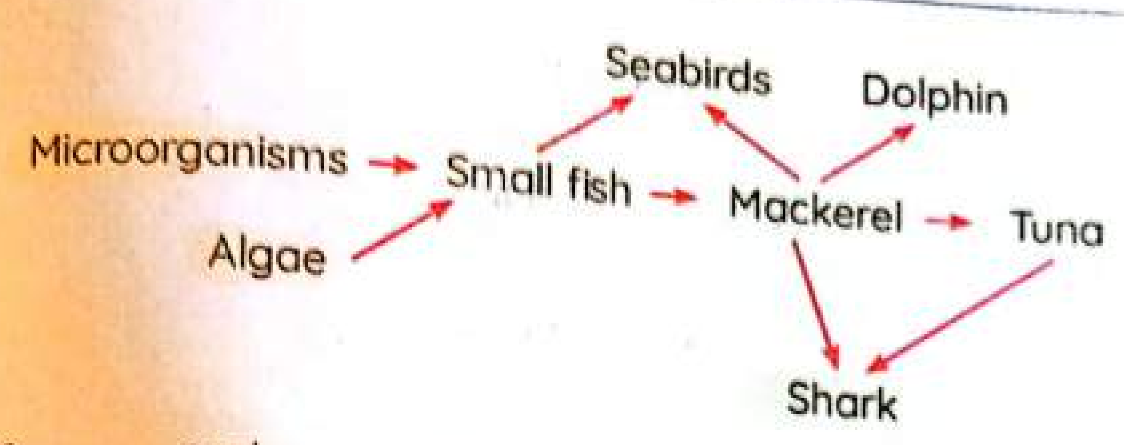
   a. Population change may happen due to ....
   b. Small fish are the main source of energy for .... to survive.
   c. Microorganisms can't survive in .... water.
   d. Microorganisms are considered .... in some marine food webs.

5 Study the following figure, then complete the sentences below:

1. The figure represents ....
2. The .... is the producer.
3. The .... and .... are primary consumers.
4. .... is the main source of energy.

5. If grass is removed, rabbits will ....
6. If rabbits disappear, grass will ...., while hawks may .... or ....

6 Study the following figure, then use it to complete the sentences below:



1. The .... and .... are considered producers.
2. The ...., ... and .... are top predators.
3. The .... is the primary consumer.
4. .... build their nests on the mountain cliffs.
5. Seabirds are secondary consumers when feeding on ....
6. Seabirds are tertiary consumers when feeding on ....

7 Give reasons for:

1. Climate change may affect the population.
2. Microorganisms are the producers of some marine food webs.
3. Sometimes microorganisms have to move to other habitats.

8 What happens if:

1. The climate change is unsuitable?
2. The water of the ocean becomes warm (concerning microorganisms)?

Lesson 3



Activity  Habitat Loss

- A healthy habitat provides living organisms with food, water, and shelter.
- Some human activities may destroy the habitats of living organisms.

Examples of human activities:



Adding buildings and roads



بناء المباني وإنشاء الطرق

Throwing wastes in water



إلقاء المخلفات في المياه



Overfishing

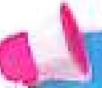


الصيد الجائر



- Human activities may cause habitat loss for many living organisms, which is one of the main reasons of extinction.

قد تتسبب الأنشطة البشرية في فقدان الموطن للعديد من الكائنات الحية وهو أحد الأسباب الرئيسية للانقراض.



Important Note:

- Human activities can also impact the weather and nonliving factors, such as raising the temperature of the water in some areas of the ocean.

قد تؤثر الأنشطة البشرية في المناخ والعناصر غير الحية مثل ارتفاع درجة حرارة الماء في بعض المناطق في المحيط.

Coral Reefs



They are from the most diverse and valuable ecosystems on Earth.

الشعاب المرجانية:

الشعاب المرجانية من أكثر الأنظمة البيئية تنوعًا وقيمة على الأرض.

Importance of coral reefs

1. Coral reefs provide food and shelter for many marine organisms.
2. Coral reefs are also important for tourism.
   - Tourists travel to coral reefs for fishing or diving, which increases the income of hotels and restaurants.

أهمية الشعاب المرجانية:

- تمد الشعاب المرجانية الكائنات البحرية بالغذاء والمأوى.
- تعتبر الشعاب المرجانية أيضًا ذات أهمية كبيرة للسياحة؛ لأن السياح يسافرون إليها من أجل الصيد والغوص؛ مما يزيد من دخل الفنادق والمطاعم.



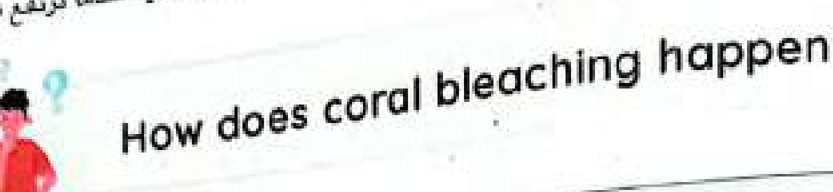
Coral Bleaching



Coral bleaching happens when the water temperature rises.

ظاهرة ابيضاض الشعاب المرجانية:

يحدث ابيضاض الشعاب المرجانية عندما ترتفع درجة حرارة الماء.

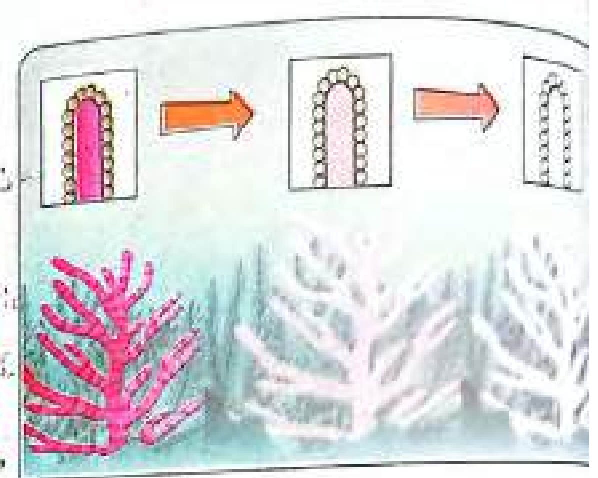


How does coral bleaching happen?



When the water becomes too warm:

1. Coral reefs will get rid of the algae living in their tissues.
2. This causes the coral reefs to turn completely white.
3. Bleaching events stress coral reefs, so they do not survive.



كيف يحدث ابيضاض الشعاب المرجانية؟

عندما يكون الماء دافئًا جدًا:

1. تتخلص الشعاب المرجانية من الطحالب التي تعيش داخل أنسجتها.
2. هذا يسبب تحول الشعاب المرجانية إلى اللون الأبيض تمامًا.
3. في النهاية تتعرض الشعاب المرجانية للفناء نتيجة ابيضاضها وتعرضها للإجهاد.

Give reasons for...



- Coral bleaching has negative impacts on the marine food web.

  Because many marine organisms will lose their food and shelter.

- Coral bleaching has negative impacts on human communities.

  Because people who depend on coral reefs for tourism or fishing will negatively be affected.

يؤثر ابيضاض الشعاب المرجانية سلبيًا على الشبكة الغذائية البحرية بسبب فقدان العديد من الكائنات البحرية للمأوى والغذاء.

يؤثر هذا الابيضاض سلبيًا على الأشخاص الذين يعتمدون على الشعاب المرجانية في السياحة أو في الصيد.

Activity 8 Plastic Pollution

A huge amount of plastic garbage is thrown into the marine ecosystem every year, and most of it comes from land.

التلوث بفعل المواد البلاستيكية:
• يتم إلقاء كميات كبيرة من المواد البلاستيكية في البيئة البحرية كل عام ويأتي معظمها من اليابسة.

Give a reason for...



Plastic has a bad effect on marine organisms.

Because plastic is not nutritious and it could be sharp or toxic.

• المواد البلاستيكية لا تحتوي على أي قيمة غذائية ومن الممكن أن تكون سامة أو حادة.

Microplastics: They are small plastic pieces that are even smaller than a grain of rice.

الجسيمات البلاستيكية: هي قطع بلاستيكية أصغر من حبة الأرز.





How are microplastics formed



*Plastic pieces get broken down into smaller pieces called microplastics by the effect of the Sun.

كيف تكونت الجسيمات البلاستيكية؟ تتكسر المنتجات البلاستيكية إلى قطع أصغر تحت تأثير أشعة الشمس.

Unit 1

The Effect of Plastic Pollution on Marine Life

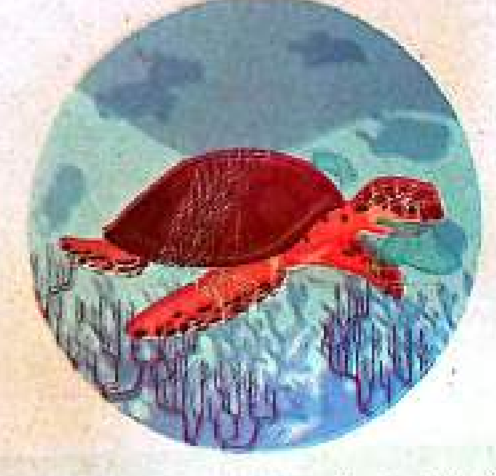
Some marine organisms cannot know the difference between real food and plastics, such as whales, turtles, seabirds, and fish.

بعض الكائنات البحرية لا تستطيع معرفة الفرق بين طعامها الحقيقي وبين المواد البلاستيكية، مثل الحيتان والسلاحف والطيور البحرية والأسماك.

Examples:

Turtles

Turtles eat a lot of plastic pieces thinking that they are jellyfish.



تأكل السلاحف البحرية المواد البلاستيكية اعتقادًا منها أنها قنديل البحر.

Corals

Corals filter the seawater to get their food, so they ingest microplastics.



يقوم المرجان بتصفية ماء البحر للحصول على طعامه وبالتالي قد يبتلع المرجان الجسيمات البلاستيكية.

Some ways to reduce plastic pollution:

- Using less plastic
  استخدام المواد البلاستيكية بكميات أقل.
- Stop throwing plastic into the water.
  التوقف عن إلقاء المخلفات البلاستيكية في المياه.
- Recycling plastic waste
  إعادة تدوير المواد البلاستيكية.

Choose the correct answer:

1. Humans change the habitats in many ways, except .... :
   a. by adding roads
   b. by overfishing
   c. drought
   d. by polluting ecosystems
2. Human activities can also impact the .... in the ecosystem.
   a. rainfall
   b. sunlight
   c. wind
   d. climate
3. A healthy marine habitat provides fish with ....
   a. food and shelter
   b. clean air
   c. clean water
   d. a and c
4. Increasing water temperature may cause all the following, except ....
   a. increasing microorganisms
   b. córal bleaching
   c. migration of fish
   d. death of seabirds
5. Coral reefs are considered ....
   a. producers
   b. consumers
   c. decomposers
   d. ecosystems
6. Living organisms may die or go extinct due to all the following reasons, except ....
   a. habitat loss
   b. human activities
   c. sunlight
   d. pollution
7. When the water is warm, coral reefs become completely ....
   a. dark
   b. white
   c. red
   d. colorless
8. When the water becomes too warm, corals ....
   a. can get food
   b. get rid of the algae
   c. become dark
   d. survive
9. Turtles can get energy from ....
   a. sharks
   b. seabirds
   c. jellyfish
   d. plastic
10. Plastic pieces in water are not ....
    a. sharp
    b. toxic
    c. harmful
    d. nutritious
11. Plastic products get broken down into smaller pieces by the effect of the ....
    a. water
    b. Sun
    c. moon
    d. air
12. All the following can reduce plastic pollution, except ....
    a. using less plastic
    b. avoiding throwing plastic
    c. breaking plastic
    d. recycling plastic

2 Put (✓) or (✗):

1. Habitats provide organisms with everything they need to survive. ( )
2. Human activities can also impact the temperature of ocean water. ( )
3. Coral reefs are living organisms that can make their own food. ( )
4. Coral bleaching happens when the water temperature decreases. ( )
5. Colored coral reefs are an example of a healthy ecosystem. ( )
6. Humans have to stop dumping plastic into the sea, as it affects marine animals positively. ( )
7. Sea turtles eat a lot of plastic to get energy to survive. ( )
8. Corals ingest the microplastics from the seawater. ( )

3 Write the scientific term:

1. It's a phenomenon in which the coral turns completely white. (..........)
2. They are the most diverse and valuable marine ecosystems on Earth. (..........)
3. They're small pieces of plastic that are smaller than the grains of rice. (..........)

4 Complete the following sentences using the words between the brackets:

(jellyfish - nutritious - filter - decreases - ingest - toxic - extinction - sharp - increases - shelter)

1. Habitat loss is one of the main causes of ....
2. Coral reefs provide marine organisms with food and ....
3. Recycling plastic .... water pollution.
4. Coral bleaching happens when the water temperature ....
5. Sea turtles eat a lot of plastic thinking that they are ....
6. Corals .... water and .... the microplastics.
7. Plastic is not ...., it could also be .... and ....

5 Study the following figure, then answer the questions below:

1. What is the name of this phenomenon?
2. What is the reason for this phenomenon?

6 Study the following figures, then answer the questions below:


Figure (A)


Figure (B)

1 Figure (.........) is formed due to the effect of the Sun.

2 Figure (.........) has a bad effect on turtles because turtles eat them, thinking they are jellyfish.

3 Figure (.........) has a bad effect on corals when they filter the water to get their food.

7 Give reasons for:

1 Coral reefs are very important for marine communities.

2 Plastics are so harmful for marine organisms.

3 Sometimes corals feed on microplastics.

4 Sometimes sea turtles feed on plastic pieces.

5 Increasing the water temperature have a bad effect on marine ecosystems.

8 What happens if:

1 The water becomes warm (concerning coral reefs)?

2 A road is added in the forest for moving cars?

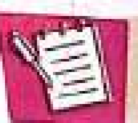
9 Mention three ways that can reduce plastic pollution:

1 ....

2 ....

3 ....

Lesson 4



Activity 9 Record Evidence Like a Scientist: Protecting Ecosystems

» Now you have learned about changes in food webs. How can you describe protecting ecosystems now?

Question:

» What might happen to a food web when an organism changes or the environment changes within an ecosystem?



My Claim:

____

____

Evidence:

____

____

____

____



Scientific Explanation with Reasoning:

____

____

____

____

____

____

Activity 10 Habitat Restoration

» **Human activities can cause big changes to the environment, such as:**

- Humans remove many plants that erode riverbanks.
- Floods may reach farther places when wetlands are drained.



- يقوم الإنسان بإزالة كميات هائلة من النباتات ويترتب على ذلك تآكل ضفاف الأنهار.
- مما يسبب وصول الفيضانات إلى أماكن أبعد بسبب جفاف الأراضي الرطبة.

» Once harm has been done to the environment, **scientists**, **engineers**, and **citizens** work on restoration.

- بمجرد حدوث الضرر البيئي يشرع المهندسون والعلماء والمواطنون في عمليات الإصلاح.

Habitat restoration • It is the process of returning the habitat to its natural state before the harm was done.

عملية الإصلاح: هي عملية استعادة الموطن الطبيعي إلى ما كان عليه قبل وقوع الضرر.

Restoration projects include repairing all parts of a habitat by



1. Bringing back food and water sources.
2. Restoring shelters and spaces.

تشمل عملية الإصلاح كلًا من:

1. إعادة مصادر الماء والغذاء.
2. استرداد المأوى للكائنات الحية لكي تتعايش.



Give a reason for...

- **Habitat restoration projects reduce the negative impacts of human activities.**

Because it helps in repairing all parts of a habitat and preventing the species from extinction.

» One example of habitat restoration is:

Coral reefs rehabilitation project in Arabian Gulf

مشروع إعادة تأهيل نمو الشعاب المرجانية الذي يحدث في الخليج العربي

1. Scientists harvest small parts of coral species.
2. Scientists move these small parts to a nursery.
3. Healthy coral reefs can then grow and reproduce.
4. They're moved back to the reefs where they were dying.



Nursery

An area in the ocean where scientists take care of small pieces of corals until they grow and are moved back to the reefs where they were dying.



1. يحصد العلماء أجزاء صغيرة من مختلف الأنواع المرجانية.
2. يقوم العلماء بنقل تلك الأجزاء الصغيرة إلى المشتل.
3. يمكن للشعاب المرجانية السليمة بعد ذلك الاستمرار في النمو والتكاثر.
4. يتم إعادة الشعاب المرجانية المزدهرة إلى المكان المتضرر مرة أخرى.

المشتل: منطقة في المحيط يقوم العلماء فيها برعاية الأجزاء الصغيرة من الشعاب المرجانية؛ حتى يمكن إعادتها إلى أماكن الشعاب المرجانية المتضررة.

Note:

- Scientists conduct researches to study the best coral species to use them in future restoration projects.

- يقوم العلماء في الخليج العربي بدراسة أفضل أنواع الشعاب المرجانية؛ لاستخدامها في مشاريع الإصلاح المستقبلية.

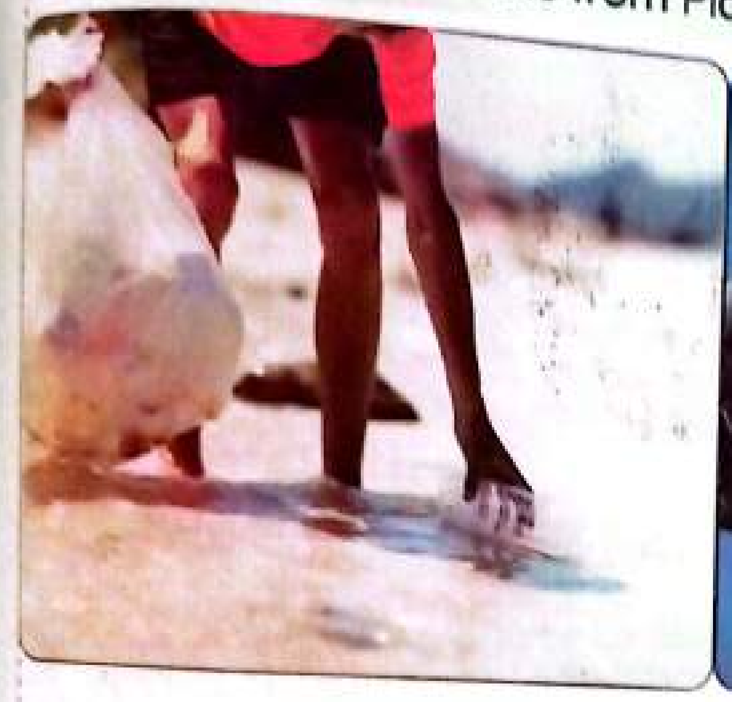




- A habitat is not restored?

  - Many species in this habitat may be lost and populations will decrease because they no longer have everything they need to survive.

Protecting Coral Reefs from Plastic Pollution





» In Egypt, coastal communities near coral reefs have adopted a "zero plastics" way of life by limiting single-use plastic on land.

- في مصر، تبنت المجتمعات الساحلية القريبة من الشعاب المرجانية أسلوب حياة "خال من البلاستيك" من خلال الحد من استعمال المواد البلاستيكية على اليابسة والتي تستخدم لمرة واحدة.

Check your understanding?



» Read the following sentences, then put (✓) or (✗):

1. Habitat restoration projects allow scientists to decrease the harms that occur to an ecosystem. ( )
2. Egyptian coastal communities aim to decrease usage of plastic products to 0%. ( )

Exercises on Lesson 4

1 Choose the correct answer:

1. Cutting down a lot of trees near river banks may increase the damage of ....
   a. oxygen gas b. rainfall c. flooding d. overfishing
2. The restoration processes try to ....
   a. decrease food resources b. repair damage in ecosystems
   c. increase pollution d. remove shelters
3. Coral reefs rehabilitation project in the Arabian Gulf represents ....
   a. extinction b. coral bleaching
   c. recycling d. a restoration project
4. Using .... can help in decreasing plastic waste.
   a. plastic forks b. plastic bags
   c. single-use plastics d. cloth bags
5. In Egypt, coastal communities have adopted a .... way of life.
   a. recycling b. restoration
   c. zero plastics d. bleaching
6. What is the best action we have to do to restore our ecosystems?
   a. Keeping natural resources healthy
   b. Overfishing
   c. Using natural resources only d. Removing plants

2 Put (✓) or (✗):

1. Restoration projects try to restore natural resources. ( )
2. A nursery helps small pieces of corals grow and reproduce. ( )
3. Using plastic grocery bags is better than using cloth bags. ( )
4. We must always use single-use plastics to decrease plastic pollution. ( )
5. "Zero plastics" means decreasing the use of plastics by 100%. ( )

3 Write the scientific term:

1. It's the process of returning the habitat to how it was before the damage was done. (..................)
2. It is an area in the ocean where small pieces of corals are nurtured. (..................)
3. It's a way of life adopted by coastal communities in Egypt to reduce plastic pollution. (..................)

4 Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1 Restoration	a. is a healthy area where the small pieces of corals can grow.
2 Eroding banks	b. means decreasing the use of plastics to 0%.
3 Nursery	c. causes flooding to reach farther places.
4 "Zero plastics"	d. is the process of recovering damaged ecosystems.

1 .... 2 .... 3 .... 4 ....

5 Give reasons for:

1. The restoration process has positive effects on ecosystems.
....
2. The nursery plays an important role in restoring damaged coral reefs.
....

6 What happens if:

- Damaged habitats are not restored?
....

Assess Your Learning

School Book Questions on Unit 1

1 Choose the correct answer:

1. .... is the main source of energy for all living organisms.
   a. Food   b. Water   c. Sun   d. Moon
2. .... absorb the sunlight that the plant needs to make its own food.
   a. Roots   b. Leaves   c. Xylems   d. Stems
3. All the following are considered producers, except ....
   a. grass   b. hawks   c. seeds   d. fruits
4. .... can make their own food.
   a. Plants   b. Humans
   c. Animals   d. Plants and some animals
5. .... return the blood that carries carbon dioxide back to the heart.
   a. Lungs   b. Xylems   c. Arteries   d. Veins
6. If the pollution in an ecosystem increases, the population of the living organisms ....
   a. increases   b. decreases   c. stays the same   d. doesn't change

2 Compare between the following:

1. What happens to the plant in the presence of light and in darkness.
2. Transportation in plants and humans.
3. Producers and consumers.

3 Put (✓) or (✗):

1. In plants, the light energy is converted into chemical energy. ( )
2. The vessels of the transport system of the human body differ from those in the plant, and both don't have the same role. ( )
3. Living organisms depend on each other to get energy. ( )
4. The ecosystem consists of living organisms only. ( )

5 A food web is a group of linked (interconnected) many food chains that show the different feeding relationships. ( )

6 Human activities affect only the living organisms in the environment. ( )

4 Rewrite the following sentences after correcting the underlined words:

1 Consumers help in the decomposition of the remains of plants and dead animals into nutrients that can be retuned to the ecosystem.

2 Rising the temperature of the water turns the color of the coral reefs into green.

3 Producers need moonlight to make photosynthesis process.

5 Answer the following:

Eagle







Mouse



Grass



- You have a group of living organisms, form a food chain of them.

....

....

Theme 2

Matter and Energy





Unit 2 Particles in Motion

Unit Concepts:

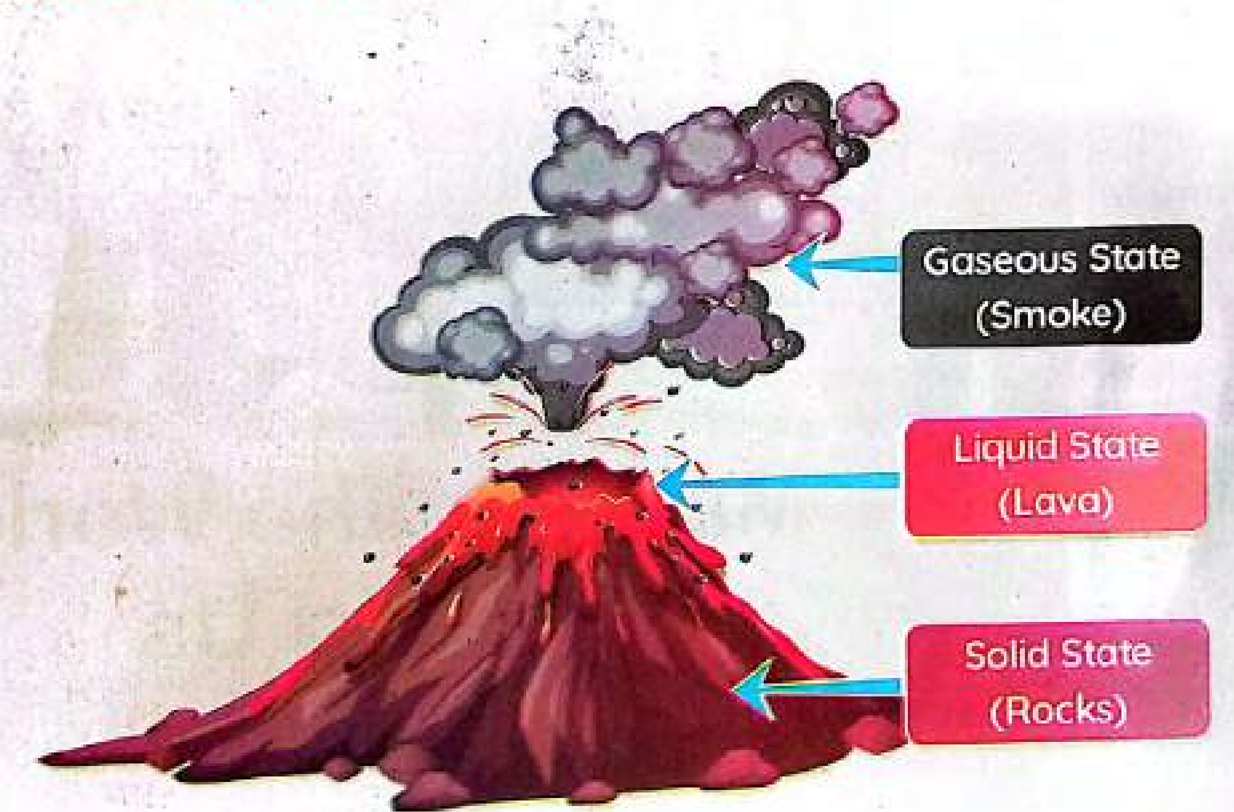
Unit Objectives

In this unit, we will study:

1. States of matter.
2. Structure of matter.
3. Measuring and observing matter.
4. Physical changes of matter.
5. Chemical changes of matter.
6. Mixtures and their properties.

States of Matter

- Matter exists in three states: solid, liquid, and gas
- This following figure represents the three states of matter during a volcanic eruption.



Hourglass



- It is a tool that holds sand in one compartment.
- People used it to track time in the past.

- When the hourglass is set on one end, the sand runs from the top section into the bottom section.

الساعة الرملية:

هي أداة زجاجية تحمل الرمل في الجزء العلوي منها:

- هي أداة استخدمها الناس لتتبع الوقت في العصور القديمة.
- عند ضبط الساعة الرملية تتحرك الرمال من الجزء العلوي إلى الجزء السفلي في الساعة الرملية.



Concept 1 Matter in the World Around Us

Concept Objectives:

By the end of this concept, students will be able to:

- Communicate the defining characteristics of the three states of matter.
- Explain how changes in states of matter result in changes to the movement of the particles within matter.
- Develop models of particles of matter in different states.

Key Vocabulary:

- Solid
- Liquid
- Gas
- Matter
- Material
- Mass
- Model
- Particle
- Property
- State of matter

Concept 1

Matter in the World Around Us

Lesson 1	
Activity 1	Can you explain?
Activity 2	States of Water

Lesson 2	
Activity 3	Observing Matter
Activity 4	Matter

Lesson 3	
Activity 5	Particles of Matter
Activity 6	Modeling the Particles of Matter
Activity 7	Tiny Particle Size

Lesson 4	
Activity 8	Models
Activity 9	Modeling States of Matter

Lesson 5	
Activity 10	Record Evidence Like a Scientist: States of Water
Activity 11	Careers and States of Matter

Lesson 1


Activity  Can You Explain?

- Matter is everywhere around us.
- Matter is anything that has **mass** and takes up **space**
- Any matter consists of tiny, moving **particles** that can't be seen by the naked eye.
- Matter can exist in the form of **solids**, **liquids**, or **gases**



Solid


Liquid


Gas

- To describe any matter, scientists study its properties, such as **color**, **shape**, **hardness**, **temperature**, **mass**, **volume**, ... etc.

• توجد المادة في كل مكان حولنا.
• المادة هي كل شيء له كتلة و يشغل حيزًا من الفراغ.
• تتكون المادة من جسيمات متناهية الصغر في حالة حركة مستمرة لا يمكن رؤيتها بالعين المجردة.
• قد تكون المادة صلبة أو سائلة أو غازية.
• لوصف المادة، يقوم العلماء بدراسة خصائص كل مادة مثل اللون، الشكل، الصلابة، درجة الحرارة، الكتلة، الحجم.. إلخ

In this concept, we will study:

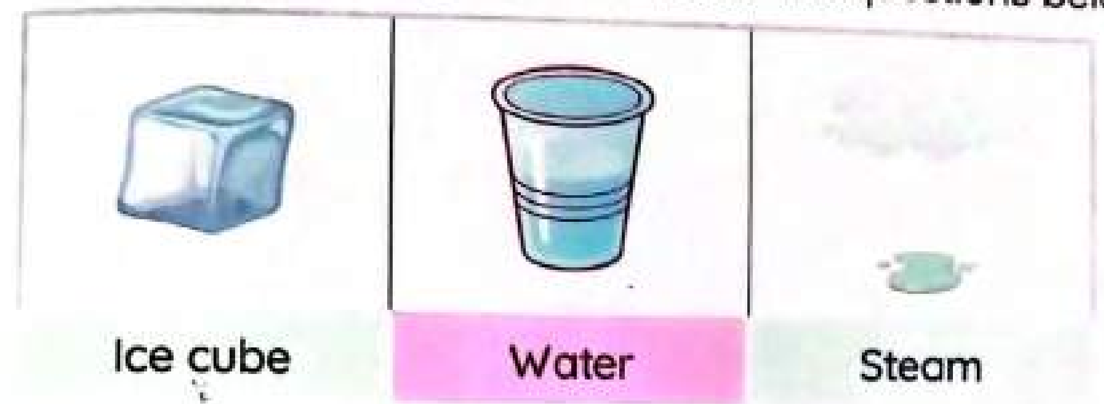
- States of matter.
- Measuring and observing matter.
- Properties of matter.
- Structure of matter.



Activity 2 States of Water



- Matter can exist in three different states (forms). Each state has its own properties.
- Observe the following images, then answer the questions below:



Ice cube	Water	Steam

What is the similarity ? The three images represent the same matter (water).

What is the difference ? The three images have different states.

ما وجه الشبه بين الصور؟ تمثل الصور الثلاث نفس المادة (الماء).

ما وجه الاختلاف بين الصور؟ تمثل الصور الثلاث حالات مختلفة من المادة.

Check your understanding?



- Classify the following matter in the table below:

(Juice - Steam - Oil - Oxygen - Sand - Water - Wood - Carbon dioxide - Feather - Plastic - Glass)

Solids	Liquids	Gases
....	....	....
....	....	....
....	....	....
....	....	....

Exercises on Lesson 1

1 Choose the correct answer:

1 Anything that has mass and occupies space is called ....

a. energy b. force c. matter d. weight

2 Water is a matter that can be found in .... state(s) in nature.

a. one b. two c. three d. four

3 All the following examples represent solid states, except ....

a. oil b. ice c. sand d. rock

4 Matter consists of tiny .... in a state of motion.

a. cells b. particles c. nutrients d. proteins

5 The nonliving things (1), (2), and (3) are ....

a. the same matter and have the same state
b. the same matter and have different states
c. different matter and have the same state
d. different matter and have different states

6 .... are different matter, but they exist in the same state.

a. Water and ice b. Wood and air
c. Milk and juice d. Air and water

7 .... are the same matter, but they exist in different states.

a. Wood and brick b. Oxygen and air
c. Oil and tea d. Ice and water vapor

8 .... is an example for solid matter

a. Wood b. Oxygen c. Vinegar d. Water vapor

2 Put (✓) or (✗):

1 Water can be found in three states. ( )

2 Matter exists everywhere around us in nature. ( )

3 Matter consists of tiny moving particles. ( )

4 We can see particles inside matter with our naked eyes. ( )

5 Matter can be changed from one state to another. ( )

6 Steam is a liquid state of water. ( )

3 Write the scientific term:

1 It's anything around us that has mass and occupies space.(..........)

2 They're tiny units from which the matter is made up of. (..........)

4 Complete the following sentences:

1 Matter is anything that has .... and occupies space.

2 Matter can exist in .... states, that are ...., ..., and ....

3 ...., ... and .... are examples of gaseous states.

4 The .... is water in a solid state

5 Anything around us is made up of ....

5 Cross out the odd word:

1 Oil - Milk - Steam - Tea (..........)

2 Air - Water vapor - Ice - Carbon dioxide (..........)

6 Give a reason for:

Air is matter.

....

7 Classify the following words in the table below:

Book - Smoke - Milk - Gold - Salt - Rock - Oxygen - Oil

Solid State	Liquid State	Gaseous State
....	....	....
....	....	....
....	....	....




Unit 2

Lesson 2

Activity 3 Observing Matter

Experiment

In this experiment, we will identify the different properties of solids, liquids, and gases.

Tools:

Container (A) contains a baseball	Container (B) contains orange juice	Container (C) contains air

Steps:

1. Observe the properties of matter in the three containers.
2. Record your observations in the following table.

Matter	State	Color	Texture	Shape	Volume
Container (A)	Solid	White	Smooth	Definite	Definite
Container (B)	Liquid	Orange	Moist	Not definite (indefinite)	Definite
Container (C)	Gas	Colorless	No texture	Not definite (indefinite)	Not definite (indefinite)

Conclusions:

- Solids have definite shapes and volumes.
- Liquids have a definite volume but no definite shape, so they take the shape of the container.
- Gases have no definite shape or volume, so they take the shape and volume of the container.

» From the previous experiment, we can observe that:

- Both solids and liquids are alike in having a definite volume.
- Both liquids and gases are alike in having an indefinite shape.

Important Note:

- Most gases, like air, are invisible, but
  - we can see the wind blowing objects around.
  - we can see a balloon getting larger when we blow air into it.

Check your understanding?



1 Complete the following sentences with the words between the brackets:

(Wood - juice - Steam - shape - ice - volume)

1. .... and .... have no definite shapes.
2. .... and .... have definite volumes.
3. Water has a definite .... and an indefinite ....

2 Put (✓) or (✗):

1. Both liquids and solids have definite volumes. ( )
2. Gases have neither a definite shape nor a definite volume. ( )
3. Most solid materials can take the shape of the container. ( )
4. Liquids and solids have definite shapes. ( )
5. Air is not matter because it is invisible to us. ( )



Activity 4 Matter

Matter • It is anything that has mass and takes up space.

المادة: هي كل ما له كتلة ويشغل حيزًا من الفراغ.

Examples of Matter



- Matter is something that we can feel, see, or even smell.
- Some matter is too small to be seen with the human eye, like air or germs.
- Matter in any state, solid, liquid, or gas, takes up space.
- There are no two matters that can take up the same space at the same time.

• المادة هي شيء من الممكن أن نشعر به أو نراه أو نستطيع شمه.

• هناك بعض المواد أصغر من أن تلاحظها أعين الإنسان، مثل الهواء والجراثيم.

• تشغل المادة سواء أكانت صُلبة أم سائلة أم غازية حيزًا من الفراغ.

• لا يشغل جسمان نفس الحيز في نفس الوقت.



Important Note:

- Light, sound, and heat are not matter, but they are considered forms of energy.

• لا يعتبر الضوء والصوت والحرارة مادة، ولكنها أنواع مختلفة من الطاقة.

What is matter actually made of ?

- Matter is made up of tiny identical **particles** in a continuous motion.
- Particles known as **molecules** make up all matter.

• تتكون المادة من جسيمات صغيرة متطابقة في حالة حركة مستمرة.
• الجسيمات معروفة باسم الجزيئات التي تشكل كل مادة.

Example:

• Your hand, desk, and pencils consist of **tiny particles** that you can't see with your **naked eye**.




• تتكون يدك والمكتب والقلم الرصاص من جسيمات متناهية في الصغر لا تستطيع رؤيتها بالعين.

Comparing Particles Inside Each State

	Solids	Liquids	Gases
Shape of Particles			
Spaces between Particles	• They are very close to each other (**packed tightly**).	• They have **more space**.	• They have **a lot of space**.
Energy of Particles	• They have **less** energy.	• They have **more** energy.	• They have **a lot of** energy.
Motion of Particles	• They move only a **little bit**.	• They move **more freely**.	• They move **very freely**.

How much the particles are moving → **determines** → the state of the matter

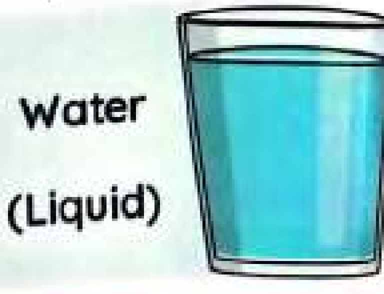
حركة الجسيمات المتحركة — تحدد — حالة المادة

Matter states:

Matter can change from one state to another, such as:







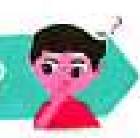
Hot

Cool

• يمكن للمادة أن تتغير من حالة لأخرى بمرور الوقت مثل:

- انصهار الثلج إلى الماء.
- تجمد الماء إلى الثلج.

Check your understanding?



» Complete the following sentences using the words between the two brackets:

(heating – particles – freezing – Solids – melting – Gases – cooling – Liquids)

1. .... can be poured and they take the shape of their container.
2. .... keep their shape unless something is done to change them.
3. .... completely fill a closed container, and take its shape.
4. Ice changes to water by .... through the .... process.
5. Water changes to ice by .... through the .... process.
6. Matter consists of tiny moving .... that can't be seen.

Measuring Matter

We can measure:

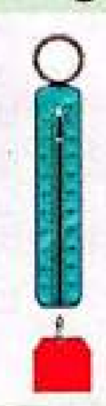
Length



Using:

- A measuring tape
- A metric stick
- A ruler (measuring small lengths)

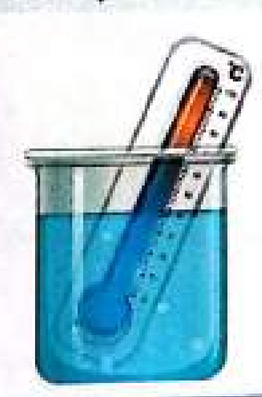
Weight



Using:

- A spring scale

Temperature



Using:

- A thermometer

Observing Matter



We can observe air filling up a balloon.

يمكنك ملاحظة الهواء الذي يملأ البالون.



We can observe milk being poured into a glass cup.

يمكنك ملاحظة الحليب يصب في كوب زجاجي.

xercises on Lesson 2

Choose the correct answer:

1 The opposite matter represents the particles of ....

a. milk
b. oxygen
c. wood
d. oil

2 .... is considered a form of energy.

a. Water
b. Water vapor
c. Ice
d. Sound

3 .... has a definite volume and takes the shape of its container.

a. Ice
b. Steam
c. Oil
d. Wood

4 The particles of .... move only a little bit.

a. water
b. solids
c. liquids
d. gases

5 The particles of matter in figure .... are packed together tightly.

a. A
b. B
c. C
d. A and B

A B C

6 Tiny particles inside the .... move very freely.

a. water
b. air
c. wood
d. ice

7 You can measure the length of matter using a ....

a. ruler
b. measuring tape
c. scale
d. a and b

8 A spring scale is used to measure the .... of matter.

a. weight
b. length
c. color
d. temperature

9 .... have definite shapes and volumes.

a. Gases
b. Solids
c. Liquids
c. a and b

10 Gas particles move ....

a. a little bit
b. slowly
c. freely
d. very freely

11 Which of the following examples is not matter?

a. A bird's feathers
b. A cup of water
c. An empty cup
d. A bird's sound

12 Some matter is very small and we cannot see it, such as ....

a. water
b. germs
c. pencils
d. insects

13 The particles inside any matter can be described by all the following properties, except that ....

a. they are tiny
b. they can be seen by the eyes
c. they are in continuous motion
d. they are identical

2 Put (✓) or (✗):

1 Milk can take the shape of the container that it is poured into. ( )

2 The particles of ice move more freely than those of water. ( )

3 The particles of wood are packed tightly together. ( )

4 Water has indefinite shape and volume. ( )

5 We can measure the length using the thermometer. ( )

6 Solid matter particles have a lot of space between them. ( )

7 The steam has an indefinite shape and volume. ( )

8 Liquids have a definite shape but an indefinite volume. ( )

9 Solid matter is made up of tiny identical moving particles. ( )

10 All matter around us can be seen easily by our eyes. ( )

11 Gases completely fill a closed container, such as when you blow a balloon. ( )

12 A solid keeps its shape when it is moved from one place to another. ( )

13 Gases can be poured and take the shape of their container. ( )

14 Some matters are so small that we cannot see them with our eyes. ( )

15 A liquid has a definite shape and volume. ( )

16 Matter is something that we can feel, see or smell. ( )

Unit 2

3 Write the scientific term:

1. It's a state of matter that has a fixed shape and volume. (..................)
2. It's a state of matter that has a lot of space between its particles. (..................)
3. It's a state of matter that has an indefinite shape and volume. (..................)
4. It's a state of matter whose particles move a little bit. (..................)
5. It's a state of matter whose particles move very freely. (..................)
6. It's a tool that is used to measure the length of a book. (..................)
7. It's a tool that is used to measure the weight of an apple. (..................)
8. It's a tool that is used to measure the temperature of hot milk. (..................)
9. It's the process in which water changes into ice. (..................)
10. It's the process in which ice changes into water. (..................)
11. It's anything around us that has mass and occupies space. (..................)
12. They exist inside matter and they are in a continuous motion. (..................)
13. It's the state of matter that takes the shape of the container that it is poured in. (..................)

4 Cross out the odd word:

1. Water – Air – Light – Wood (..................)
2. Oil – Vinegar – Water – Ice (..................)

5 Complete the following sentences:

1. Some matter is so small and we cannot see it, such as .... or ....
2. .... matter can be poured in a container and takes ....
3. One difference between solids and liquids is that solids have ....

...hat suits it in column (B):

A

Column (A)	Column (B)
1 Solid state	a. has particles that move very freely.
2 Liquid state	b. has a definite shape and volume.
3 Gaseous state	c. can be poured in a container.

1 .... 2 .... 3 ....

B

Column (A)	Column (B)
1 Thermometer	a. is used to measure the height of a boy.
2 Spring scale	b. is used to measure the temperature of hot tea.
3 Measuring tape	c. is used to measure the weight of your pet.

1 .... 2 .... 3 ....

Study the following figures, then choose the correct answer:

1. Water in figure (1) is in the .... state. (gaseous – solid)
2. The particles are packed tightly in .... (figure 1 – figure 2)
3. The matter in .... has no definite shape. (figure 1 – figure 2)

1	2

Give reasons for:

1. Milk is considered a liquid matter.
2. Water vapor has no definite shape and no definite volume.
3. A book is a solid matter.

Lesson 3



Activity 5 Particles of Matter





What is matter made of?

If you could break down a piece of gold into smaller and smaller pieces, you would end up with extremely small pieces called particles that you could no longer see, even with a microscope.

إذا كان بإمكانك تقسيم قطعة من الذهب إلى قطع أصغر، سينتهي بك الأمر بقطع صغيرة جدًا تسمى الجسيمات التي لم يعد بإمكانك رؤيتها، حتى باستخدام المجهر.

- Matter consists of tiny identical particles in a state of motion.
- A particle is known as "the building unit of matter".
- Different kinds of matter are made of different kinds of particles; for example, particles of wood are different from particles of gold.

• تتكون المادة من جسيمات متماثلة ومتناهية في الصغر في حالة حركة.
• يعتبر الجسيم هو وحدة بناء المادة.
• تتكون المواد المختلفة من أنواع مختلفة من الجسيمات.
(على سبيل المثال فإن الجسيمات داخل الخشب مختلفة تمامًا عن الجسيمات داخل الذهب).

Let's observe different kinds of particles:

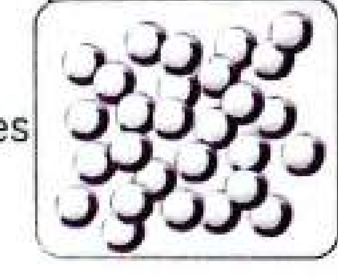
1 Particles of solids:



- They are packed (held) closely together, so:
  - They keep their shape (particles not spread in air).
  - They vibrate around their places without moving.

الجسيمات مترابطة وقريبة من بعضها (متماسكة معًا):
• تحافظ المادة الصلبة على شكلها (الجسيمات لا تنتشر في الهواء).
• تهتز الجسيمات في موضعها ولا تغير أماكنها.

2 Particles of liquids:



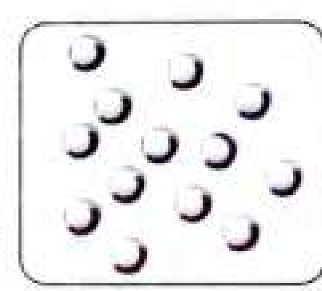
» They are held together more loosely, so:

- The particles of liquids move faster than the particles of solids.
- They can move and slide over each other.
- Liquids take the shape of their container.

ترتبط جسيماتها بروابط أقل من الحالة الصلبة:

- تتحرك الجسيمات في الحالة السائلة أسرع من جسيمات الحالة الصلبة.
- تستطيع الجسيمات الحركة والابتعاد عن بعضها.
- تتخذ السوائل شكل الإناء الذي توضع فيه.

3 Particles of gases:



» The particles are not held together, so:

- The particles can move very quickly.
- The particles spread out to fill up any container they are put in.

تتكون من جسيمات غير متماسكة:

- تتحرك الجسيمات في الحالة الغازية بسرعة كبيرة.
- تنتشر لتملأ أي إناء توضع فيه.

Give a reason for...?

- Liquid substances can be poured, while solid substances cannot be poured.

Because liquids have indefinite shapes, while solids have definite shapes.

What happens if...?

1. Water changes into steam (according to the speed of particles)?

The speed of particles will increase.

2. Water changes into ice (according to the speed of particles)?

The speed of particles will decrease.

Activity 6 Modeling the Particles of Matter



» When you leave ice cubes on the table on a hot sunny day:

1 **The Sun will heat up the particles in ice,** so the particles of the ice cubes move faster and the ice changes into water.	
2 **The Sun will heat up the particles in water,** so the particles of water move faster and the water changes into water vapor.	

We always use models to make ideas more clear.





Solid



Liquid



Gas

Ex.: We can model the particles inside matter using ping pong balls.

They are 3D units, and we can separate them from each other, so you can describe:

- The space between the particles.
- The motion of the particles.

تعتبر كور البنج أجسام ثلاثية الأبعاد يمكن فصلها و بالتالي قد تصف لنا:

- المسافات بين الجسيمات. • حركة الجسيمات.



Activity 7 Tiny Particle Size

» Particles inside matter are very tiny, and normal microscopes cannot detect them.

• الجسيمات صغيرة للغاية حيث لا تستطيع المجاهر العادية اكتشافها.

The Sizes of Particles

• The average size of a particle is so tiny that:

One hair is about 150,000 to 300,000 particles thick.

• أحجام الجسيمات تكون متناهية الصغر.

• الشعرة الواحدة = ما يعادل ١٥٠,٠٠٠ إلى ٣٠٠,٠٠٠ جسيم.



One hair

» **The size of particles depends on:**

1. The type of the particle.
2. How particles are connected (bonded) together.

• يعتمد الحجم الفعلي للجسيم على: نوع الجسيم، وكيفية ارتباط الجسيمات معًا.



Blood cells

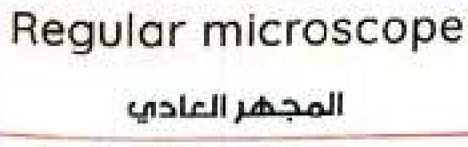
How can we see each particle?



• Scientists can use electron microscopes to see individual particles, such as one blood cell.

• Regular microscopes are not powerful enough for us to see them.

• يستخدم العلماء الميكروسكوب الإلكتروني لرؤية الجسيمات المنفردة مثل خلية الدم الواحدة التي لا تستطيع رؤيتها بالميكروسكوب العادي.



Regular microscope المجهر العادي	Electron microscope المجهر الإلكتروني
	
Has a less magnifying power.	Has a much more magnifying power.

How can we show that particles exist?

Examining gases can help prove that these invisible particles really do exist.

يمكن أن تساعد دراسة الغازات في إثبات أن هذه الجسيمات غير المرئية موجودة بالفعل.

What happens when you blow up a balloon?

1 The particles in the gaseous state move very quickly.

2 They bounce against the inside of the balloon.

3 This exerts a force that inflates the balloon and creates its round shape.

• تتحرك الجسيمات في الحالة الغازية بسرعة كبيرة.

• ترتد داخل البالون. يؤدي هذا إلى قوة تضخم البالون وتشكل شكله الدائري.



If you squeeze the balloon,

the balloon becomes smaller, and the particles become closer together.

• إذا ضغطت على البالون، فيمكنك تصغيره عن طريق دفع الجزيئات بالقرب من بعضها البعض.



If you squeeze the balloon too hard,

the balloon pops, and the particles escape into the air.

• إذا ضغطت على البالون بشدة، سينفجر البالون، وتهرب الجزيئات في الهواء.

Misconception	Correction
Some people think that gases are not matter because they are invisible.	Gases are matter because they have mass and take up space.



Choose the correct answer:

1. The particles of .... can slide over each other and take the shape of their containers.

   a. air b. iron c. milk d. wood

2. Gas is characterized by all the following, except that ....

   a. it completely fills a closed container
   b. its particles move very quickly
   c. its particles have a lot of space
   d. its particles vibrate around their place

3. From the properties of particles inside solids is that ....

   a. they are packed closely together
   b. they generally do not move from one place to another
   c. they can't slide over each other
   d. all the previous answers

4. From the properties of hydrogen gas is that ....

   a. its particles move very quickly
   b. it has a definite shape and volume
   c. its particles vibrate around their place
   d. its particles are packed tightly

5. The speed of motion of particles is arranged from the slowest to the fastest in: ....

   a. Wood - air - oil b. Oxygen - milk - iron
   c. Ice - water - water vapor d. Rock - rivers - mountains

6. When ice cubes are exposed to heat, ...

   a. their particles move faster b. their particles move slower
   c. the cubes change into water d. a and c

7. The particles inside wood are characterized by all the following, except that they ....

   a. cannot escape in air b. are in a neat arrangement
   c. are packed closely together d. take the shape of the container

8 The size of a particle depends on ....

a. the type of the particle

b. how the particle connects with the neighboring particles

c. the color of the particle

d. a and b

9 Scientists can use .... to see individual particles inside matter.

a. magnifying lenses

b. regular microscopes

c. electron microscopes

d. a thermometer

10 When you blow a balloon, ...

a. air particles bounce against the inside of the balloon

b. air particles move very quickly

c. air particles exert a force that inflates the balloon

d. all the previous answers

11 When we heat up a piece of ice, the particles of ice will ....

a. move faster

b. move slower

c. not move

d. be closer

12 Gases are matter because they have ....

a. mass

b. shape

c. volume

d. a and c

Put (✓) or (✗):

1 Particles of gold are different from particles of water. ( )

2 Regular microscopes can help us see individual particles of matter. ( )

3 We use an electron microscope to see one blood cell. ( )

4 When you blow a balloon, air particles exert a force that inflates the balloon. ( )

5 Gases are not matter because they are invisible. ( )

6 When you expose an ice cube to sunlight, the particles of ice move faster and turn into liquid. ( )

7 When you squeeze a balloon, it will pop, and the gas particles will escape. ( )

8 By changing the temperature of the matter, its state changes. ( )

3 Write the scientific term:

1. It's the state of matter in which the particles are packed in a neat arrangement. (..................)
2. It's the state of matter in which particles spread out and escape quickly. (..................)
3. It's a special microscope that is used to see the components of one blood cell. (..................)
4. It's the state of matter that can be poured into a container. (..................)
5. It's the state of matter that keeps its shape when we move it to another place. (..................)
6. It's the invisible state of matter that completely fills a closed container. (..................)

4 Complete the following sentences:

1. Matter is anything that has .... and occupies ....
2. The particles inside a solid matter are .... closely together and cannot ....
3. The particles inside a .... matter take the shape of their container.
4. The particles inside a liquid matter move faster than the particles in a .... matter.
5. .... particles move more freely than liquid particles.
6. If you break down a piece of gold into smaller and smaller pieces, you will end up with very small pieces of matter called ....
7. When ice cubes are exposed to heat, they change to a .... state, then with the continuous exposure to heat, they change to a .... state.
8. Scientists can use special microscopes called .... to see individual particles.
9. When you blow a balloon, gas particles exert .... that inflates the balloon.
10. When you blow a balloon, the air will move .... inside it.
11. When the Sun heats up particles of water, the water will ....
12. When we heat ice, it will change from a .... state into a .... state.



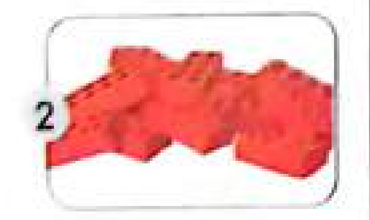
Choose from column (A) what suits it in column (B):

A

Column (A)	Column (B)
1 	a. The particles are spread out and escape.
2 	b. The particles are packed closely together.
3 	c. The particles can be poured in a container.

1 .... 2 .... 3 ....

B

Column (A)	Column (B)
1 	a. The particles are held together more loosely.
2 	b. The particles are held together.
3 	c. The particles are not held together.

1 .... 2 .... 3 ....

6 Fill the following table, then mention the states of containers A, B, & C:

Particles in Container A	Particles in Container B	Particles in Container C
• The particles are held together more 1 .... • The particles take the shape of their container. • The particles move 2 .... than the particles in a solid.	• The particles are 3 .... closely together and cannot move from each other or escape into space. • The particles are packed in a neat and ordered arrangement, so that they can keep their 4	• The particles are not held together. • The particles spread out to fill up any 5 .... they are put in. • The particles can move very 6 ....

- Container (A) contains a .... matter.
- Container (B) contains a .... matter.
- Container (C) contains a .... matter.

7 Give reasons for:

1. Solids can keep their shape.
2. Gases can escape into space.
3. Scientists use electron microscopes to study the particles in matter.

8 What happens if:

1. Ice cubes are exposed to heat (concerning the state and the speed of the particles)?
2. You blow up a balloon (concerning the particles speed)?
3. You squeeze the balloon more?

Lesson 4



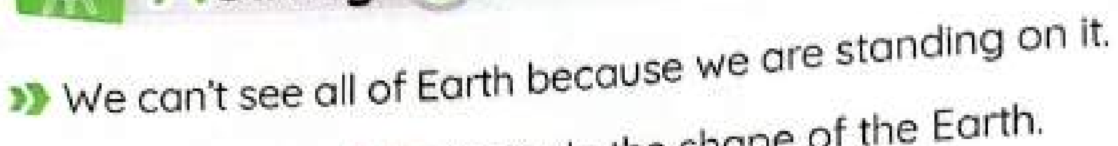
Unit 2





Activity 8 Models

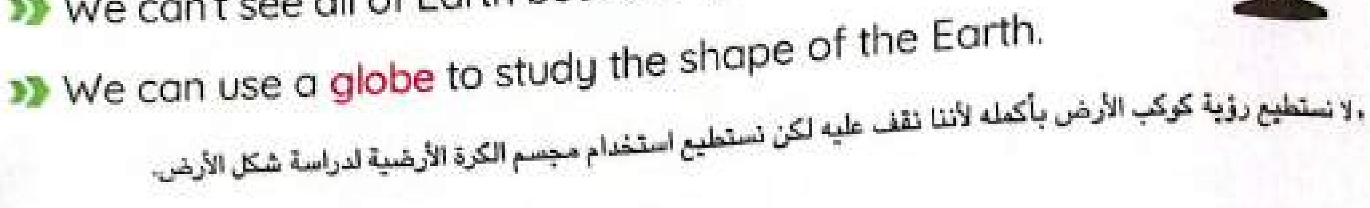




- We can't see all of Earth because we are standing on it.



- We can use a **globe** to study the shape of the Earth.



• لا نستطيع رؤية كوكب الأرض بأكمله لأننا نقف عليه لكن نستطيع استخدام مجسم الكرة الأرضية لدراسة شكل الأرض.



Model • It is a copy that is similar to the real thing.

النموذج: هو نسخة مشابهة تمامًا للشيء الحقيقي الذي يمثله.

Importance of models:

1. Models are a great way to see many things at the **right size** (not the real size).
   - Models represent very big things in smaller sizes.
   - Models represent very small things in larger sizes.
2. Models help us understand how things work.



أهمية النماذج:

1. تساعدنا النماذج على رؤية الأجسام بالحجم المناسب لنا (ليس الحجم الحقيقي).
   - رؤية الأجسام الكبيرة بصورة أصغر.
   - رؤية الأجسام الصغيرة بصورة أكبر.
2. تساعدنا النماذج على فهم كيفية عمل الأشياء.



Note:

- Models look, move, or work like the real thing.

• تشبه النماذج الجسم الحقيقي وتتحرك مثله وتعمل مثله.

1 Models help us look at big things.
النماذج تمكننا من رؤية الأجسام الضخمة عن قرب

» Gigantic things are hard to see. Models can bring them down to size.

• باستخدام النماذج يمكننا رؤية العديد من الأشياء العملاقة التي من الصعب رؤيتها، وذلك عن طريق تقليص حجمها.



A globe is used as a model of Earth. It is not a real planet.

» A globe shows you:

1. The shape of Earth.
2. How much of the Earth is covered with oceans.
3. Where different countries are located.



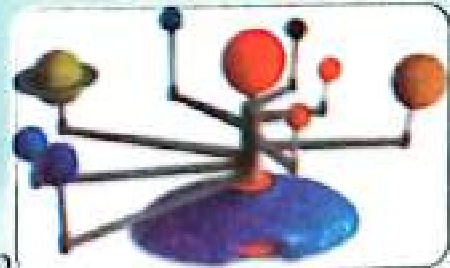
• يُسْتَخْدَم مجسمُ الكرة الأرضية كنموذج لكوكب الأرض ولكنه ليس كوكبًا حقيقيًا.

• تظهر لك الكرة الأرضية:

1 شكل كوكب الأرض. 2 كيف أن الأرض مغطاه بالمحيطات. 3 مواقع الدول المختلفة.

Solar System

1. It shows us all the planets at once
2. **It helps us compare them according to:**
   - a **Size:** Which planet is the biggest?
   - b **Location:** Which one is the closest to Earth?



1 نموذج المجموعة الشمسية يظهر لنا جميع الكواكب معًا.

2 **يساعدنا في المقارنة بينها وفقًا لما يلي:**

a **الحجم:** أي كوكب أكبر؟ b **الموقع:** أي كوكب أقرب إلى الأرض؟

2 Models help us look at small things.

النماذج تمكننا من رؤية الأجسام الصغيرة بوضوح.

» Models can represent very tiny things in a larger size.



A germ model helps us to:



1. See the shape of germs without a microscope.
2. See the different parts that help germs spread from one person to another.

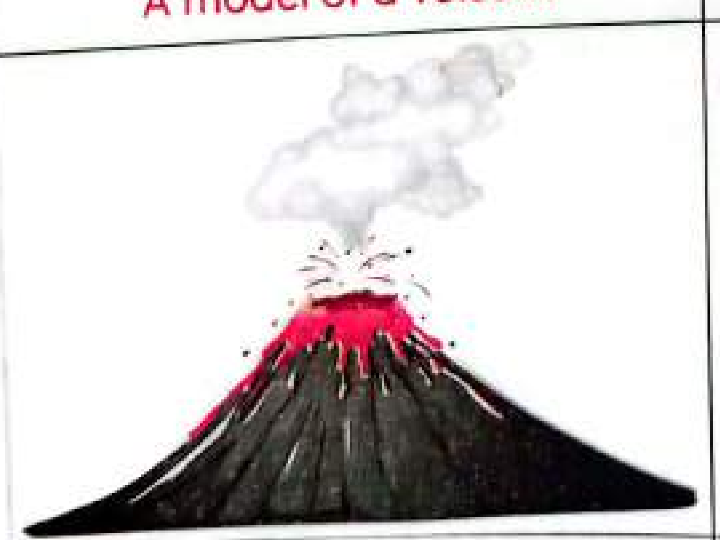
1 نموذج جراثيم: يمكن أن يعرض لك شكل الجراثيم حتى بدون استخدام المجهر.

2 يمكنك رؤية الأجزاء المختلفة التي تساعد الجراثيم على الانتقال من شخص إلى آخر.

3 Models help us understand how things work.

النماذج تمكننا من رؤية كيفية عمل الأشياء.

» Models help us see and understand how things work, such as:

A model of a volcano	A model of an airplane
	
Shows how ooze liquid comes out during a real eruption.	Shows how an airplane flies up in the air.

تساعدنا النماذج علي رؤية وفهم كيفية عمل الأشياء:

نموذج بركان: يوضح كيف يفرز البركان سائلًا ما أثناء ثوران بركان حقيقي.

...رة: يوضح كيف يطير في الهواء.




Activity 9 Modeling States of Matter

Experiment

» In this activity, you will create three models to represent the arrangement of particles inside the different states of matter.

Tools:

Three index cards	Small buttons	Glue	Marker

Steps:



1. Label the three index cards with a solid, liquid, or gas using a marker.
2. Glue the small buttons to the index cards to create a model of a solid, liquid, or gas.

Observations:

» **In solid state:**(particles are organized.)
The particles are packed neatly and arranged in a regular pattern.

» **In liquid state:**(particles are not well organized.)
The particles are held together more loosely.

» **In gaseous state:**(particles are not organized at all.)
The particles are not held together.

Conclusions:

» Matter is made up of tiny particles.
» The arrangement of particles describes the state of matter.

Exercises on Lesson 4

1 Choose the correct answer:

1. Models can help us see many things at the .... size.
   a. real b. wrong c. right d. same
2. A globe is a model that shows you the shape of the ....
   a. Earth b. moon c. volcano d. Sun
3. Models can represent very tiny things in bigger sizes, such as a/an .... model.
   a. globe b. volcano c. airplane d. germ
4. The model which shows us all the planets is called the .... model.
   a. solar system b. globe c. volcano d. germs
5. Models help us ....
   a. see and understand how things work
   b. see what we could not see
   c. learn about many things at their real size
   d. a and b
6. In order to compare between planets, you can use a ....
   a. measuring tape b. model c. magnifying lens d. scale
7. Models help us understand and study ....
   a. too small objects only b. too big objects only c. particles in gases d. all the previous answers
8. In a liquid state, the particles are ....
   a. held together b. held together more loosely c. not held together d. organized

2 Put (✓) or (✗):

1. The globe is a real planet. ( )
2. Models can only be used to describe very small objects. ( )
3. Models help us see germs without a microscope. ( )

4 Models are a great way to see many things at the right sizes. ( )

5 In gaseous matter, the particles have a random arrangement. ( )

6 In a solid state, the particles have a regular pattern. ( )

7 The arrangement of the particles describes the state of the matter. ( )

3 Write the scientific term:

1 It is a model that helps us compare planets. (..........)

2 It is a copy that is similar to the real thing. (..........)

3 It is a model that shows you the shape of the Earth. (..........)

4 It's the state of matter in which particles are held together. (..........)

5 It's the state of matter in which particles are not held together. (..........)

6 It's the state of matter in which particles are held together more loosely. (..........)

4 Complete the following sentences:

1 A .... model shows us all planets, while a .... model shows us the Earth only.

2 A .... model shows us the liquid that comes out from a volcano during a real eruption.

3 To show the particles of a solid, we stick the buttons in a very .... and .... arrangement.

4 Gas particles have .... distance between them.

5 Choose from column (A) what suits it in column (B):

A

Column (A)	Column (B)
1 A germs model	a. shows us the Sun only.
2 A globe	b. shows us the Earth only.
3 A solar system model	c. shows us all planets.
	d. shows us very tiny objects.

1 .... 2 .... 3 ....

5

Column (A)	Column (B)
1 To show a solid state.	a. we stick the buttons with large distances between them.
2 To show a liquid state.	b. we stick the buttons with short distances between them.
3 To show a gaseous state.	c. we stick the buttons in an ordered and organized form.

1 ______ 2 ______ 3 ______

6 Give reasons for:

1 The globe is a great tool to study the Earth.

____

2 A solar system model can help students know the differences between planets.

____

3 Models play a great role in learning.

____

4 The arrangements of particles inside a solid state is different than in a liquid state.

____

7 Study the following figure, then answer the questions:

1 The particles inside matter (______) are moving very slowly.

2 The particles inside matter (______) have a lot of spaces between them.

3 The particles inside matter (______) are packed closely together.

Lesson 5



Activity 10 Record Evidence Like a Scientist: States of Water

Concept 1

Question:

» What are the different forms of matter that can be found in the world around us?

My Claim:

____

____

Evidence:

____

____

Scientific Explanation with Reasoning:

____

____

____

____

____

____



STEM in Action



Activity 11 Careers and States of Matter

- Chefs use science to prepare delicious dishes.
- Chefs use different states of matter to change ingredients.

• When chefs boil some water to cook pasta or rice, you can see the steam that is a gaseous matter. • عندما يقوم الطباخون بوضع الماء على النار لسلق المكرونة أو الأرز، يمكنك مشاهدة البخار الذي يمثل الماء في حالة غازية.	
• Chefs freeze some vegetables Because freezing keeps them fresh and ready to use for longer periods of time. • يقوم الطباخون بوضع الخضراوات داخل الفريزر في الثلاجة؛ للحفاظ عليها طازجة لفترات طويلة.	

- Aroma (gaseous state) coming from the kitchen can help us guess the kind of food using our sense of smell.
  - الرائحة المنبعثة من المطبخ (حالة غازية) قد تساعدنا في معرفة نوع الطعام.



Scientist Chef

- Like a professional chef, you can experiment the different states of matter in your kitchen.

What happens if...

1. You add a cup of water into the freezer for a period of time.
   The water freezes and changes from water to ice.
2. You add boiled vegetables to a bowl of cold, ice water.
   The temperature of the vegetables decreases, while the temperature of water increases.

...rcises on Lesson 5

1 Choose the correct answer:

1. .... is the process that helps in preserving vegetables.
   a. Heating b. Evaporation c. Freezing d. Condensation
2. In a solid state, the particles ....
   a. are not held together
   b. take the shape of their container
   c. can keep their shape
   d. move quickly
3. The particles of .... has (have) a lot of energy.
   a. a solid b. a liquid c. a gas d. all matters
4. Water changes into steam by ....
   a. heating b. cooling c. melting d. freezing
5. .... particles are not organized at all.
   a. Juice b. Vinegar c. Oxygen d. Water

2 Put (✓) or (✗):

1. The motion of particles in liquids is slower than that in solids. (   )
2. Freezing keeps food ready to use for shorter periods of time. (   )
3. Steam is an example of a liquid state. (   )
4. When we put a cup of juice in the freezer, it changes into gas. (   )
5. A gaseous state of matter helps you guess the lunch from the aroma coming from the kitchen. (   )

3 Complete the following sentences using the words between the brackets:

(gaseous - liquid - solid - definite - indefinite - regular - random)

1. The .... particles move very quickly in all directions.
2. Liquids have .... shapes and .... volumes.
3. Particles of solids have .... arrangements.
4. A .... state takes the shape of the container.

4 Write the scientific term:

1. It's a process that keeps vegetables fresh and ready to use for longer periods of time. (..........)
2. It's the state of water after freezing. (..........)
3. It's the state of water after boiling. (..........)

5 Give reasons for:

1. Solid particles can keep their shape.

....

2. Chefs can freeze some vegetables.

....

6 What happens if:

1. You leave a cup of milk in the freezer (concerning the change in the state of matter)?

....

2. You boil some water for a long period of time?

....



Concept 2

Describing and Measuring Matter

Concept Objectives:

By the end of this concept, students will be able to:

- Classify materials based on their properties and describe patterns in the properties of similar materials.
- Choose the appropriate tools to measure the size and volume of different kinds of materials in different states of matter.
- Plan and conduct investigations to gather and record information about the properties of various materials.
- Analyze data to identify unknown materials.

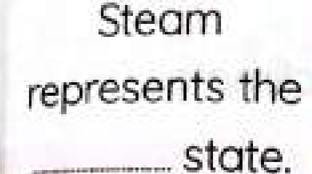
Key Vocabulary:

- Mass
- Material
- Matter
- Measure
- Property
- Substance
- Volume

Concept 2

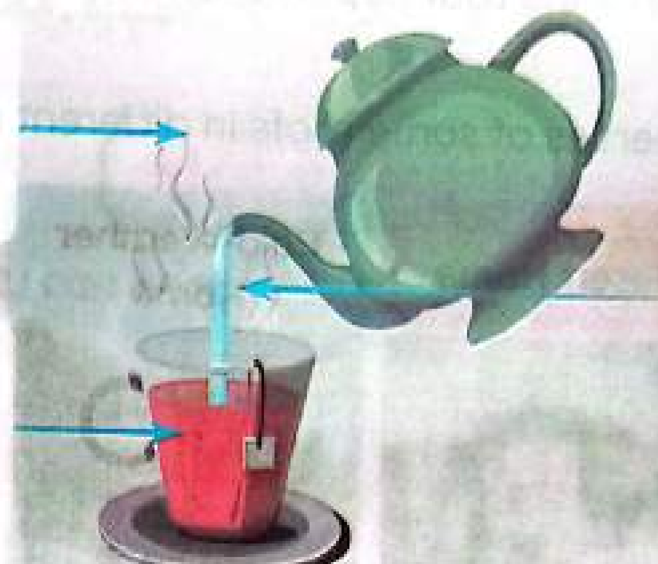
Describing and Measuring Matter





Activity 1 Can You Explain?

» Observe the following figure, then complete:



Steam represents the .... state.

Water that is poured represents the .... state.

The glass cup represents the .... state.

You have learned that:

» Matter is everything around us that has mass and takes up space.

» Matter can be described by many properties, such as:



Shape: round



Texture: smooth



Color: white

» Matter can be measured using special tools, such as:



Ruler



Thermometer



Balance

Unit 2

Activity 2 A Roof for Every Type of Climate

- Every building has a roof that protects it from dust, dirt, rainwater, snow, or animals.
- The shape of the roof may be flat or inclined (slanted).
- The kind of material of the roof depends on the climate where the home is located.
- Let's study the properties of some roofs in different climates:

	Desert Home	Cold-Weather Home	Tropical Rainforest Home
Figure			
Material of the Roof (The roof is made up of)	Strong stones	Ceramic tiles (bricks)	Leaves and sticks
Shape of the Roof	Flat	Inclined (slanted)	Inclined (slanted)
To Protect the Home From	Dust and dirt	Rain and snow	Animals getting inside it

Roof	سقف	Climate	المناخ
Dust	غبار	Stones	الطوب
Dirt	تراب	Ceramic tiles	بلاط السيراميك
Flat	مستوي	Leaves	أوراق النباتات
Inclined = Slanted	مائل	Stick	عصا



Activity 3 What Do You Already Know About Describing and Measuring Matter?

Concept 2

Describing Matter

» We can describe any matter by its properties, such as:

color, shape, texture, odor, and volume.

Measuring Matter

» Each property can be measured using a special measuring tool.

For example:

Length

It is measured by a ruler or tape measure.



Volume

It is measured by a measuring cup.



Mass

It is measured by a balance (scale).



Temperature

It is measured by a thermometer.



- Each matter has its own properties.
- Measuring the properties of matter helps us know its suitable use.

• لكل مادة خصائص محددة.

• يساعدنا قياس خصائص المادة في تحديد الاستخدام الأمثل لها.

Exercises on Lesson 1

Choose the correct answer:

1. You can measure the length of a book using a ....
   a. balance b. ruler
   c. thermometer d. measuring cup
2. We can know the .... of matter without using any tool.
   a. volume b. length c. taste d. temperature
3. We use thermometers to differentiate between .... matter.
   a. big and small b. heavy and light
   c. hot and cold d. tall and short
4. The roof of a desert home is made up of stones to protect it from ....
   a. rain b. snow c. animals d. dirt
5. The roofs of homes in the .... are flat.
   a. desert b. forest c. tundra d. Antarctica
6. The roofs of homes can protect us from all the following, except the ....
   a. animals b. air c. rain d. dust
7. The roofs of homes can be made from the following materials, except ....
   a. stones b. leaves
   c. glass d. bricks

Put (✓) or (✗):

1. Each matter has properties that can be described or measured. (   )
2. The roofs of desert homes should reflect heat from the Sun. (   )
3. The roofs of cold-weather homes are inclined and made up of stones. (   )
4. Different climates require different roofing materials. (   )

5. Ice and steam are different matter in the same state. ( )
6. Measuring cups can be used to measure the mass of liquids. ( )

3 Write the scientific term:

1. It's a material that is used to make the roofs of desert homes. (..........)
2. It's a material that is used to make the roofs of rainforest homes. (..........)
3. It's a device that is used to measure the mass of fruits. (..........)
4. It's a device that is used to measure the weight of an object. (..........)
5. It's a property of matter that can be measured by a measuring cup. (..........)

Complete the following sentences using the words between the brackets:

(scale - volume - stones - climate - Slanted - flat - stones - sticks)

1. .... roofs protect homes from rain and snow, while .... roofs reflect the sunlight.
2. The roof of a desert home is made up of ....
3. The roof of a rainforest home is made up of ....
4. The mass of vegetables can be measured by a ....
5. The measuring cup can be used to measure the .... of milk.
6. The kind of material that the roof is made up of depends on the ....

Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1. It is used to measure the weight of an object.	a. Spring scale
2. It is used to measure the temperature of a cup of tea.	b. Measuring cup
3. It is used to measure the length of a book	c. Thermometer
4. It is used to measure the volume of oil.	d. Tape measure
5. It is used to measure the length of a room.	e. Ruler

1 .... 2 .... 3 .... 4 .... 5 ....

6 Study the following figures, then complete the questions below:

Figure (A)	Figure (B)

1. Device (A) is used to measure the .... of water.
2. Device (B) is used to measure the .... of water.

7 Give reasons for:

1. The roof of a desert home is made up of strong stones.

....

2. The roof of a cold-weather home is slanted and made up of bricks.

....

3. The roof of a rainforest home is made up of leaves and sticks.

....

8 What happens if:

1. The roof of a desert home is not made up of strong stones?

....

2. The roof of a cold-weather home is flat?

....




Lesson 2

Activity 4 The Case of the Kitchen Mystery



Experiment

» In this activity, you will examine a variety of substances that look alike. Most of the substances are labeled, but one is a mystery.

Tools:











Steps:

1. Check the color of all the substances with your eyes.
2. Touch all the substances with your hand to feel their texture.
3. Smell all the substances to know their odor.
4. Use the lens to examine the shape of the crystals of each substance.

Observations:

» All substances have the same color.
So, it would be difficult to identify the substances if they weren't labeled.

» They have different odors.

» They have different textures, as the shape of the crystal varies.

a. Sugar has large crystals.
b. Salt has small crystals.
c. Baking powder has very fine particles.


Sugar


Salt

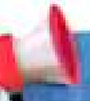
Concept 2

Unit 2

Conclusion:

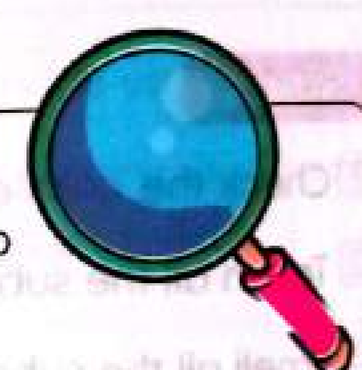
Color, shape, odor, and texture are some of the physical properties of matter that help us describe it.

• اللون والشكل والرائحة والملمس من الخواص الفيزيائية التي تساعدنا على وصف المادة.



Important Notes:

- Some physical properties, such as shape, color, odor, and texture can be observed by our five senses.
- Some physical properties, such as volume, temperature, and mass can be measured by special tools.



- The hand lens magnifies objects and enables us to see small crustals.

Check your understanding?



Complete the following sentences using the words between the brackets:

(shape - color - sight - hand lens - taste)

1. We can differentiate between salt and sugar by using our ______ sense.
2. Both salt and sugar have the same ______.
3. A ______ can help us see the of the crystals of salt clearly.
4. It is very difficult to differentiate between sugar and salt using our ______ sense.



Lesson 3



Activity 5 Properties of Matter

Properties of Matter

» The properties of any matter can be classified into:

Physical Properties	Chemical Properties
• They are the properties that can be observed or measured without any change in the matter. • مجموعة خصائص يمكن ملاحظتها وقياسها دون حدوث تغيير للمادة.	• They are the properties that describe how matter interacts with other matter to produce new matter. • مجموعة خصائص تعبر عن كيفية تفاعل المادة مع المواد الأخرى وتكوين مادة جديدة.

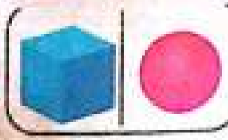
Examples

Physical Properties

1. Color

Silver ring  Gold ring

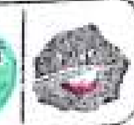
2. Shape

Cube  Round

3. Odor

 Vinegar  Perfume

4. Texture

 Smooth   Rough

Chemical Properties

1. The ability to burn:

Ex: When paper is burned, paper interacts with fire, so it becomes ash.



2. The ability to rust:

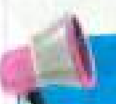
Ex: Rusting of iron nails. Iron nails interact with water and air, so they rust.



Volume and Mass

Volume and mass are properties of matter that you can measure.

Volume	Mass
• It is the amount of space that matter takes up. • مقدار الحيز الذي يشغله الجسم من الفراغ.	• It is a measurement of the amount of matter. • مقدار ما يحتويه الجسم من مادة.
Measuring Units	
1. Liters (L) 2. Milliliters (mL) 3. Cubic centimeters (cm^3) ($1 L = 1,000 mL = 1,000 cm^3$)	1. Grams (g) 2. Kilograms (kg) ($1 kg = 1,000 g$)
Measuring Device	
• Measuring cup 	• Balance 
Example	
• A big bottle of water contains 1 liter or more. 	• A paperclip has a mass of about 1 gram. 



Important Note:

• One liter of water = a mass of 1 kilogram



Temperature

• It measures how quickly the particles in a substance are moving.
• Temperature can be measured using a thermometer.
• Quick-moving particles produce more heat energy than slow-moving particles.



Activity 6 Measuring Properties

Experiment

In this activity, you will identify some physical properties of matter.

Tools:

Cork	Stone	Iron nail	Wooden block	Magnet	Balance	Water basin containing water

Steps:

1. Approach the magnet to all objects.
2. Put all objects in a water basin and observe which will float or sink.
3. Use the scale (balance) to measure the mass of each object.
4. Record all the previous results in the following table.



Observations:

Property	Wooden Block	Iron Nail	Cork	Stone
1 Attracted to the Magnet or Not	Not attracted	Attracted	Not attracted	Not attracted
2 Sink or Float	Float	Sink	Float	Sink
3 Mass	80 gm	20 gm	40 gm	70 gm

Conclusions:

- Some materials are attracted to magnets and other materials aren't attracted to magnets.
- The **floating** or **sinking** of objects doesn't depend on their masses, but depends on the density of each matter.

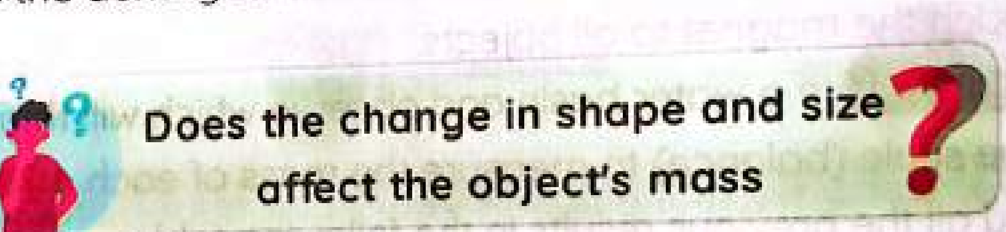
. بعض المواد تنجذب للمغناطيس والبعض الآخر لا ينجذب للمغناطيس.

. قدرة الأجسام على الطفو أو الغوص لا يعتمد على كتلتها ولكن يعتمد على كثافتها.

- **A wooden cube floats on water.** G.R
  Because the density of wood is less than the density of water.



- **An iron cube sinks in water.** G.R
  Because the density of iron is more than the density of water.



1. The change in shape doesn't affect the nail mass.



2. The change in size (volume) affects the orange mass.





Activity 7 Measuring Matter

» In this table, there are three different materials; observe the data of each one, then choose the correct answer:

	Mass (g)	Length (cm)	Volume (mL)
Material (1)	189	37	100
Material (2)	150	55	115
Material (3)	99	23	5

1. .... contains more matter than material (2). [Material (1) - Material (3)]
2. .... is taller than material (1). [Material (3) - Material (2)]
3. ...... takes up more space than material (1). [Material (2) - Material (3)]

Important Note:

• Some objects have more amount of matter and take less space.



Empty milk carton
Bigger size – Smaller mass



Baseball
Smaller size – Bigger mass

• بعض المواد كتلته كبيرة رغم أن حجمها صغير.
• مثال: حجم علبة كرتون الحليب الفارغة أكبر من حجم كرة لعبة البيسبول.
• ولكن كتلة كرة البيسبول أكبر من كتلة علبة كرتون الحليب الفارغة.

Exercises on Lessons 2 and 3

Choose the correct answer:

1. We can use a/an .... to see the small crystals of sugar.
   a. balance
   b. hand lens
   c. eyeglasses
   d. measuring cup

2. The texture and shape of matter can be observed by ....
   a. a ruler
   b. a balance
   c. our senses
   d. a thermometer

3. We can identify the difference between a golden ring and a silver ring by their ....
   a. taste
   b. odor
   c. shape
   d. color

4. All the following are considered physical properties of matter, except ....
   a. color
   b. size
   c. texture
   d. rusting

5. .... is the measurement of how quickly the particles move in a substance.
   a. Temperature
   b. Mass
   c. Size
   d. Length

6. All the following are chemical properties of matter, except ....
   a. rusting of an iron nail
   b. formation of ash
   c. lighting a match
   d. the mass of an apple

7. Which of the following is a physical property of matter?
   a. Burning of paper
   b. Rusting of iron
   c. Burning of a match
   d. Rough matter

8. Crushing the cubes of salt into powder is considered a change in the ....
   a. chemical properties
   b. physical properties
   c. a and b
   d. no correct answer

9. Mass is the measurement of the ....
   a. odor of matter
   b. length of matter
   c. amount of matter
   d. color of matter

10 The volume is the amount of .... that the matter takes up.

a. time b. space c. temperature d. matter

11 Scientists measure volume in ....

a. centimeters b. grams
c. cubic centimeters d. meters

12 The suitable unit to measure the mass of a wooden cube is ....

a. the liter b. the gram
c. degrees Celsius d. the meter

13 Which of these substances can be attracted to a magnet?

a. Cork b. Stone
c. Wooden cube d. Paper clips

14 .... float(s) on the water surface.

a. An iron nail b. A stone
c. A wooden cube d. All of the previous answers

15 A/An .... sinks in the water.

a. iron nail b. piece of cork
c. plastic spoon d. wooden cube

16 Changing the .... of an object affects its mass.

a. shape b. color
c. volume d. taste

17 A tennis ball has more .... than a big balloon.

a. temperature b. size
c. volume d. mass

2 Put (✓) or (✗):

1 You can use words, such as rough and round to describe the properties of matter. ( )

2 The ability to burn and the ability to rust are considered physical properties. ( )

3. Chemical properties can be observed without changing the structure of matter. ( )
4. We can observe some properties of matter without using special tools. ( )
5. One liter equals 1,000 milliliters, or 1,000 cubic centimeters. ( )
6. Scientists often measure mass in grams (g) or kilograms (kg). ( )
7. Salt and sugar are similar in color and texture. ( )
8. Quickly-moving particles have less heat energy than slow-moving particles. ( )
9. Wood floats on the water surface, while an iron nail sinks in water. ( )
10. A magnet can attract the paper clips that fall on the ground. ( )
11. Changing the size of the object does not affect its mass. ( )
12. Wood, cork, and stone do not get attracted to magnets. ( )
13. If we cut an apple into two halves, the mass of each half is more than the mass of the apple. ( )
14. Both of the iron cube and the wooden cube have the same volume, so they have different masses. ( )

Write the scientific term:

1. They are the properties that can be measured or observed without changing the nature of matter. (..........)
2. They are the properties that describe how matter interacts with other matter. (..........)
3. It is the amount of space that matter takes up. (..........)
4. It is a measurement of the amount of matter. (..........)
5. It is a measurement of how quickly the particles in a substance are moving. (..........)

Complete the following sentences using the words between the brackets:

A (Quickly - physical - kilograms - chemical - grams - slow - balance - liters - cubic centimeters - ash - measuring cup)

1. Color, shape, odor, and texture are examples of .... properties.
2. Forming a layer of rust on an iron nail is an example of .... properties.
3. Scientists measure mass in .... or .... by a special tool that is called a ....
4. Scientists measure volume in .... or .... by a special tool that is called a ....
5. When paper is lit on fire, it becomes ....
6. ....-moving particles can give off more heat energy than .... -moving particles.

B (shape - cork - iron nail - size - magnet - balance - ruler)

1. A .... can attract paper clips to it.
2. A .... is used to measure the length of a wood cube, while a .... is used to measure its mass.
3. The .... floats on water surface, while the .... sinks in the water.
4. Changing the .... of the object does not affect its mass.

Cross out the odd word:

1. State - Color - Rusting - Taste (..........)
2. Paper becomes ash - Burning a match - Iron color (..........)
3. Centimeter - Milliliter - Cubic centimeter - Liter (..........)
4. Gram - Kilogram - Kilometer (..........)

Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1. The amount of space of matter is	a. the mass.
2. The amount of matter is	b. the temperature.
3. We can measure the speed of motion of particles in matter by	c. the volume.

1 .... 2 .... 3 ....

Study the following figures, then choose the correct answer:

Wooden Cube	Iron Cube

(iron - wooden - volume - masses - sinks in - floats on)

1. The two cubes have the same ....
2. The two cubes have different ....
3. The iron cube .... the water.
4. The wooden cube .... the water surface.
5. A magnet can attract the .... cube.

Give reasons for:

1. A hand lens can help us know the difference between salt and sugar.
2. Burning paper is considered a chemical change of matter.

What happens if:

1. You burn a piece of paper?
2. The particles inside matter move faster (concerning the temperature)?
3. Iron nails are left in the air for a long time?
4. You put a wooden cube in water?
5. You approach a magnet to paper clips?



Lesson 4



Activity 8 Useful Properties of Matter

» In this activity, we will study the useful properties of some materials, such as helium and copper.



1 Helium

Physical Properties	Chemical Properties
• It is a light gas (lighter than air). . أخف وزنًا من الهواء.	① It is not poisonous. ② It is not flammable. ① غير سام ② غير قابل للاشتعال. A flammable material is easily set on fire.

Give reasons for...



1. Balloons and blimps filled with helium gas rise up in the air.
   Because helium gas is lighter than air.
2. Humans can use helium gas safely.
   Because helium is not flammable or poisonous.



It is used to fill balloons.
It is used to fill blimps.



2 Copper

Physical Properties

- It is a good conductor of heat and electricity.
- It can be stretched into a thin, flexible wire.

- يعتبر النحاس موصلاً جيدًا للحرارة والكهرباء.
- يمكن تشكيل النحاس على شكل أسلاك رفيعة ومرنة.

Uses of copper

1. It is used in making electrical wires. G.R Because copper is a good conductor of electricity and can be stretched into a thin, flexible wire.	
2. It is used in making cooking pans. G.R Because copper is a good conductor of heat	

Conduction • It's the ability of a material to transfer heat and conduct electricity.

التوصيل: قدرة المادة على نقل الحرارة وتوصيل الكهرباء خلالها.

Give a reason for...



- The handles of cooking pots are made of plastic or wood.

  Because plastic and wood are bad conductors of heat.

What happens if...



- The handles of cooking pots are made of metals?

  Your hands will be burned because metals are good conductors of heat.



Activity 9 Uses of Matter



» The knowledge of the properties of each matter helps us know the best way to use it.

» The following table shows different matters with their properties and uses:

Matter	Physical Properties	Purpose (Uses)
1 Steel	• Hard • Strong	• Screwdrivers • Hammers
2 Glass	• Transparent • Smooth	• Windows • Eyeglasses
3 Rubber	• Waterproof • Flexible	• Athletic shoes • Gloves • Tires

Steel	الفولاذ
Glass	الزجاج
Rubber	المطاط
Hard	قوي
Transparent	شفاف
Smooth	ناعم
Waterproof	مقاوم للماء

Flexible	مرن
Screwdrivers	مفك معدني
Hammer	شاكوش (مطرقة)
Tires	إطارات السيارة
Gloves	القفازات
Athletic shoes	الأحذية الرياضية



Activity 10 Record Evidence Like a Scientist: A Roof for Every Type of Climate

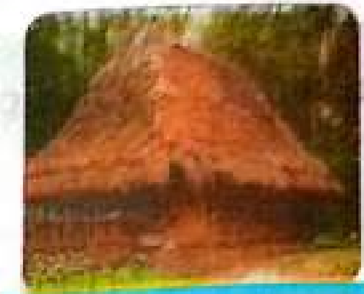
- A roof needs to protect people from the weather, falling objects, and animals.
- The kinds of materials used to make a roof depend on **where the roof is located**.



Desert Home



Cold-Weather Home

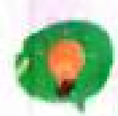


Tropical Rainforest Home



Question:

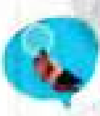
- What is matter, and how do we measure it?



My Claim:

____

____



Evidence:

____

____



Scientific Explanation with Reasoning:

____

____

____

Exercises on Lesson 4

1 Choose the correct answer:

1. From the physical properties of helium gas is that it's ....
   a. not flammable
   b. lighter than air
   c. not poisonous
   d. a and c
2. Flammable materials are easily .... when they set off a flame.
   a. rusted
   b. contracted
   c. burned
   d. shaped
3. Helium gas can be used to fill ....
   a. tires
   b. bottles
   c. tanks
   d. balloons
4. From the properties of copper is that it's ....
   a. transparent
   b. hard
   c. flexible
   d. rough
5. Cooking pots are made of copper because it is a ....
   a. good conductor of electricity
   b. bad conductor of electricity
   c. good conductor of heat
   d. bad conductor of heat
6. The handles of cooking pots are made of ....
   a. copper or wood
   b. plastic or wood
   c. iron or wood
   d. plastic or copper
7. We can use .... to make gloves and car tires.
   a. copper
   b. helium
   c. steel
   d. rubber
8. We can use glass to make ....
   a. wires
   b. windows
   c. gloves
   d. hammers

2 Put (✓) or (✗):

1. A balloon filled with helium gas rises in the air. ( )
2. The light weight of helium is a chemical property of this gas. ( )
3. Helium is not poisonous or flammable, so it is not safe to use. ( )
4. Copper is a metal commonly used to make handles for cooking pots. ( )
5. Copper can be stretched into a thin, flexible wire, which is a physical property. ( )

6 Steel is used in making screwdrivers and hammers because it is flexible. ( )

7 Gloves and tires are made from rubber because it is waterproof. ( )

Write the scientific term:

1 It's a gas that is lighter than air and is used in filling balloons.(..................)

2 It's a metal that can be stretched into thin and flexible wires.(..................)

3 It's a strong and hard metal used to make screwdrivers and hammers. (..................)

4 It's the ability of matter to transfer heat or electricity. (..................)

5 It's a flexible matter that is used in making tires and gloves.(..................)

Mention the matter used in making the following objects and the reason (property):

Matter:

Glass – Helium – Copper – Rubber – Plastic – Steel

Property:

Good conductor of electricity – Bad conductor of heat – Strong – Light gas – Water proof – Transparent

Uses	Matter	Property
1 Electric wires		
2 Handles of cooking pots		
3 Filling balloons		
4 Hammer		
5 Window		
6 Gloves		

Concept 2

5 Put the letter (P) in front of the physical properties and (C) in front of the chemical properties:

1. Helium is not poisonous or flammable, so it is safe to use. ( )
2. Helium gas is lighter than air, so it rises in the air. ( )
3. Copper can be stretched into a thin, flexible wire. ( )
4. Copper also conducts electricity well. ( )
5. Steel is strong and hard. ( )
6. Iron nails may rust after a period of time. ( )
7. Glass is transparent. ( )
8. Sugar has a sweet taste. ( )

6 Give reasons for:

1. Helium gas is safe to use.
2. Helium is used to fill balloons and blimps.
3. Copper is used to make electrical wires.
4. Copper is used to make cooking pots.
5. It would not be useful to make wires from wood.
6. The handles of cooking pots are made from wood.
7. Steel is used to make screwdrivers and hammers.
8. Glass is used to make windows and eyeglasses.
9. Rubber is used to make tires and gloves.

7 What happens if:

1. A balloon is filled with helium gas?
2. The handles of cooking pots are made of copper?



Concept 3 Comparing Changes in Matter

Concept Objectives:

By the end of this concept, students will be able to:

- Explain the relationship between changes in temperature, states of matter, and mass.
- Identify the causes of changes in the physical and chemical properties of matter.
- Investigate what happens when two or more substances are mixed.
- Classify mixtures and compounds based on what happens when they are combined.

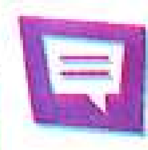
Key Vocabulary:

- Chemical change
- Chemical
- Properties
- Compound
- Energy
- Friction
- Heat
- Light
- Melt
- Mixture
- Physical change
- Thermal energy
- Water vapor

Concept 3

Comparing Changes in Matter

Lesson 1

 Activity  Can You Explain?

What happens if... 

- Ice is left out of the fridge (concerning the state and mass)?



(1)

After minutes →



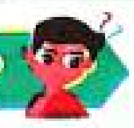
(2)

- Ice will melt and change from a solid state to a liquid state.
- The mass of matter doesn't change.

• سوف يذوب الجليد ويتحول من الحالة الصلبة إلى الحالة السائلة. • لا تتغير كتلة المادة.

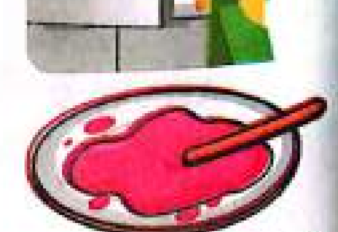
» The mass of a substance doesn't change even if it is heated, cooled, or mixed with other substances.

• لا تتغير كتلة المادة عند تسخينها أو تبريدها أو عند خلطها بمادة أخرى.

Check your understanding? 

» Sara puts the ice cream on the plate out of the fridge for a few minutes; choose:

1. The ice cream turns into a .... state. (liquid – solid)
2. This figure represents the .... process. (freezing – melting)
3. The mass of the ice cream .... (decreases – remains constant)



» Put (True) or (False):

On changing the temperature of the matter, both the mass and state change.



Activity 2 Melting Matter



What would happen to the ice in the following two figures





Ice melts slowly.



Ice melts quickly.

- As the temperature of a substance increases, it melts faster.

Melting

It is a process in which matter is changed from a solid state to a liquid state by heating.

الذوبان: إنها عملية يتم فيها تغيير المادة من الحالة الصلبة إلى الحالة السائلة عن طريق التسخين.

Note:

- Solid matter (such as ice and ice cream) should be kept at a certain temperature to stay in its solid state.

• يجب حفظ المادة الصلبة (مثل الثلج والآيس كريم) في درجة حرارة معينة للبقاء في الحالة الصلبة.

Check your understanding?



Put (✓) or (✗):

1. There is a relationship between temperature and the speed of melting. ( )
2. The amount of matter changes when its state changes. ( )
3. Ice melts and changes into water by cooling. ( )



Activity 3 Particles

Thermal (Heat) Energy

- Thermal energy is not a physical thing (matter), but it is simply a form of energy.
- Thermal energy from the Sun keeps living things on Earth alive.

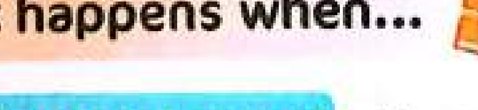
Uses of Thermal Energy

1. Warming homes
2. Cooking food



Particles in Motion

Matter — consists of very small → particles (molecules) that have energy, which makes them move, vibrate, and spin.



What happens when...

1. **Matter is heated?** Particles move faster and spread out (become far from each other).
2. **Matter is cooled?** Particles move slower and become closer together.

Particles of gases → Move faster than → Particles of Liquids → Move faster than → Particles of solids

Move slower than ← Move slower than ←

When the particles of matter absorb **light** or **thermal** energy:

Speed of the particles increases. ▶ Kinetic energy increases. ▶ Matter becomes warmer.

عندما تمتص المادة الطاقة الحرارية:

تتحرك الجسيمات الموجودة في المادة وتهتز بشكل أسرع - تزداد الطاقة الحركية - يصبح الملمس أكثر سخونة.

Check your understanding?

» Put (✓) or (✗):

1. Heat is a physical thing we use every day. ( )
2. Heat is known as thermal energy. ( )
3. The more thermal energy an object has, the warmer it is. ( )
4. The particles that make up matter are always moving. ( )

Exercises on Lesson 1

1 Choose the correct answer:

1. When we put a cup of water in the fridge's freezer, the water ....
   a. remains as it is b. changes into ice
   c. changes into water vapor d. no correct answer
2. Which of the following changes happens when ice cubes melt?
   a. The temperature decreases. b. The mass decreases.
   c. The mass increases. d. The temperature increases.
3. The .... of ice remains as it is during the melting process.
   a. temperature b. state c. mass d. shape
4. The states of matter depend on the change in the .... of the matter.
   a. mass b. temperature c. color d. odor
5. When we put milk in the fridge, its temperature .... and its mass ....
   a. increases – increases b. increases – remains constant
   c. decreases – remains constant d. decreases – decreases
6. The process of changing ice into water is called ....
   a. boiling b. freezing c. melting d. condensation
7. When the .... in a polar region, ice begins to melt.
   a. wind blows b. rain falls
   c. temperature increases d. temperature decreases
8. The mass of the ice before melting is .... its mass after melting.
   a. more than b. less than c. equal to d. no correct answer
9. Putting ice ...., makes it melt faster than exposing it to sunlight.
   a. in the freezer b. in water c. on a stove d. in the fridge
10. Matter consists of smaller units called ....
    a. proteins b. fats c. cells d. molecules
11. Heat is considered a form of ....
    a. matter b. energy c. force d. motion

2 Put (✓) or (✗):

1. The mass of a substance does not change when it is heated or cooled. ( )
2. Thermal energy affects the speed of the melting of ice. ( )
3. Heat is not a physical thing, but it is a form of energy. ( )

3 Write the scientific term:

1. It's a property of matter that does not change when matter is heated or cooled. (..........)
2. It is a process in which matter changes from a solid state to a liquid state. (..........)

4 Complete the following sentences:

1. When substances are cooled or heated, their .... do not change.
2. When .... energy or .... energy are absorbed by matter, the particles in the matter move and vibrate faster.
3. Matter changes from one state to another according to the change in its ....
4. Ice changes into water by ....
5. Heat is a form of .... that we use every day in many things, such as .... and ....
6. When light energy or thermal energy are .... by matter, the particles in the matter .... and .... faster.

5 Give reasons for:

1. Thermal energy is very important in our lives.
2. Ice melts faster when we expose it to heat.

6 What happens if:

1. Ice melts (concerning its mass and temperature)?
2. A cup of water is put in the freezer?

Concept 3




Unit 2

Activity 4 Temperature and State of Matter

Temperature and State of Matter

Temperature

It is a measurement of how much energy the particles in the substance have.

درجة الحرارة هي مقياس لمقدار الطاقة التي تمتلكها الجسيمات في المادة.

» A substance's state depends partly on its temperature.

• تتوقف حالة المادة جزئيًا على درجة حرارتها.

The energy of the particles —determines→ how much the particles move, —determines→ the state of the matter.

• طاقة الجسيمات هي التي تحدد مقدار حركتها وبالتالي حالة المادة.

Solid State → Particles inside solids have less energy and move slower.

Liquid State → Particles inside liquids have more energy and move faster.

» The melting process is the opposite (reverse) of the freezing process.

Solid (Ice) — Melting by heating → Liquid (Water)

Liquid (Water) — Freezing by cooling → Solid (Ice)



In Melting Process

Above 0°C

» The particles of solid matter gain energy and move faster, so the ice changes to water.

In Freezing Process

Below 0°C

» The particles of liquid matter lose (release) energy and move slower, so the water changes to ice.



- Water is a liquid between 0°C and 100°C.
- 0°C is the freezing point of water.
- 100°C is the boiling point of water.
- °C is the measuring unit of temperature.

Physical Changes

» The change in the state of matter is a physical change.

» Physical changes are also usually reversible.

- يعتبر تغير حالة المادة من أمثلة التغيرات الفيزيائية.
- يمكن استعادة المادة الأصلية بعد التغيرات الفيزيائية لها.

Physical changes

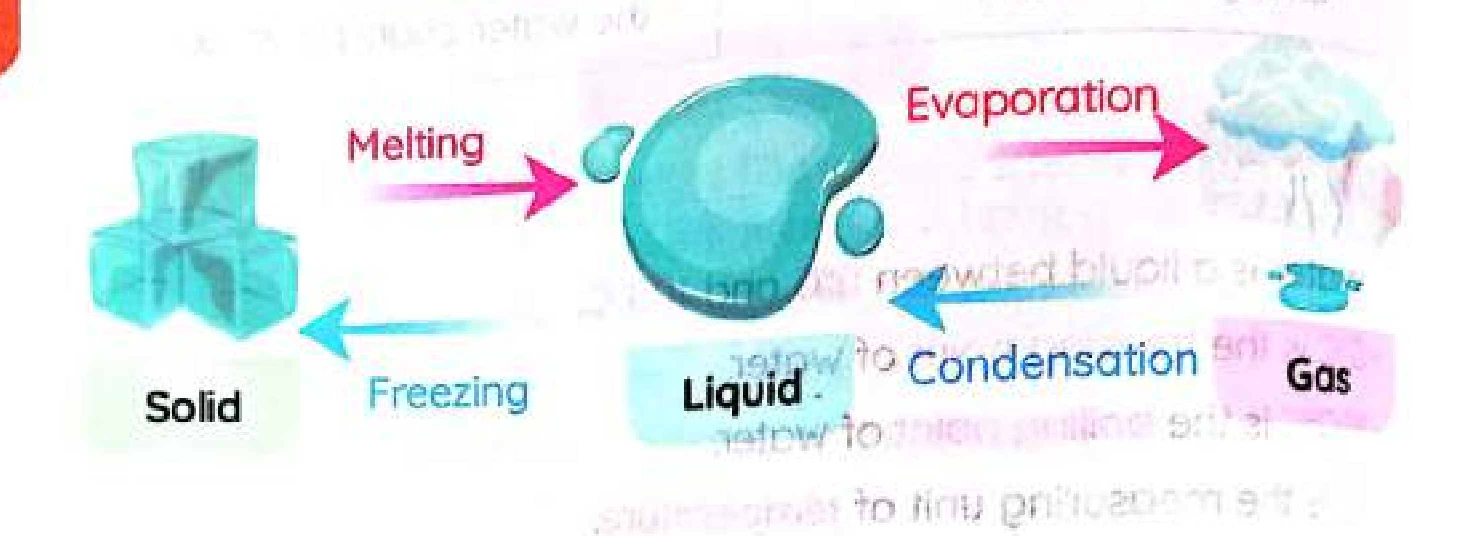
It is a change in the color, shape or state of matter without any change in its structure.

Note:

- Increasing or decreasing the temperature can also cause chemical changes, such as burning a piece of paper.

Activity 5 What's the Matter? Changing States

In this activity, we are going to study the changing states of matter.



- Melting is the opposite process of freezing.
- Evaporation is the opposite process of condensation.

1 Melting

It's the process by which matter changes from a solid state to a liquid state by heating.



- When ice is heated on a stove:

- The ice gains thermal energy, so the particles move faster and move away from each other.
- This causes ice to change into liquid.



2 Freezing

It's the process by which matter changes from a liquid state to a solid state by cooling.

- **When water freezes in the freezer:**
  - Water loses thermal energy to the surrounding air, so the particles move slower and get closer.
  - This causes water to change into ice.

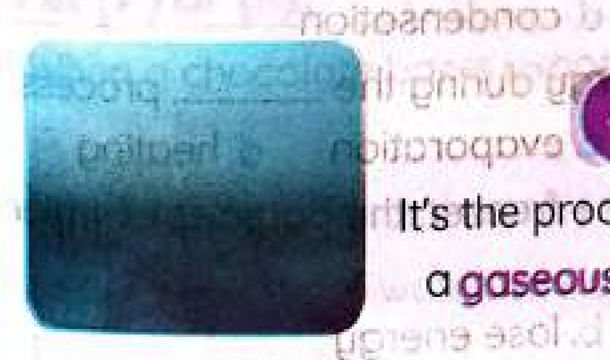


3 Evaporation



It's the process by which matter changes from a liquid state to a gaseous state by heating.

- **When water is heated on a stove:**
  - Water gains thermal energy, so the particles move faster and spread more.
  - This causes water to change into steam.





4 Condensation

It's the process by which matter changes from a gaseous state to a liquid state by cooling.

- **When water vapor touches a cold glass:**
  - The thermal energy of the steam is transferred to the cold glass, so the particles move slower and get closer.
  - This causes water to change into steam.

Exercises on Lesson 2

1 Choose the correct answer:

1. When a bar of chocolate is exposed to sunlight, it ....
   a. remains as it is
   b. melts
   c. evaporates
   d. freezes

2. The reason for the ice melting in the following figure is due to increasing the ....
   a. mass
   b. color
   c. temperature
   d. all the previous

3. .... is the process in which water changes into ice.
   a. Melting
   b. Freezing
   c. Evaporation
   d. Condensation

4. Water is a .... between 0°c and 100°c.
   a. solid
   b. liquid
   c. gas
   d. vapor

5. Water becomes .... when it is cooled below 0°C.
   a. solid
   b. liquid
   c. gas
   d. vapor

6. Which of the following state changes takes place with heating?
   a. Liquid → Solid
   b. Gas → Liquid
   c. Gas → Solid
   d. Solid → Liquid

7. Melting is a physical change that is opposite (reverse) to ....
   a. heating
   b. freezing
   c. evaporation
   d. condensation

8. The particles inside matter lose energy during the .... process.
   a. melting
   b. freezing
   c. evaporation
   d. heating

9. When you put a bottle of water in the freezer, the particles of water ....
   a. move faster
   b. lose energy
   c. gain energy
   d. become more free

10. During .... process, the particles gain energy and move faster.
    a. melting
    b. freezing
    c. condensation
    d. cooling

11. When the temperature decreases, the water vapor .... on glass.
    a. melts
    b. evaporates
    c. condenses
    d. freezes

12. Water in nature exists in .... state(s).

a. a gaseous b. a liquid c. a solid d. all the previous

13. When Sara puts a bottle of water in the refrigerator, the particles of water ....

a. gain energy b. get closer together

c. move faster d. stop moving

14. Water droplets on a window or on plant leaves represent the .... process.

a. evaporation b. freezing c. condensation d. melting

15. In which case do the particles inside the matter lose their energy?

a. Melting of ice in a container on a stove burner

b. Heating a piece of butter

c. Putting melted chocolate in the freezer

d. Heating water to make tea

16. .... and .... processes need heating.

a. Condensation – freezing b. Melting – freezing

c. Evaporation – melting d. Condensation – evaporation

17. .... and .... processes are reversed (opposite).

a. Condensation – freezing b. Melting – freezing

c. Evaporation – melting d. Condensation – melting

2 Put (✓) or (✗):

1. When a chocolate bar is exposed to a source of heat, it freezes. (   )

2. Temperature affects the state of matter. (   )

3. As the particles of water lose energy, they slow down and change into a gaseous state. (   )

4. Melting happens when the temperature of ice rises above 0°C. (   )

5. Physical changes do not change the structure of a substance. (   )

6. Heating the substances may cause physical or chemical changes. (   )

7 Melting is a chemical change that can be reversed by cooling. ( )

8 After the hot water vapor hits the cooler glass sheet, it condenses. ( )

9 Water changes to steam by cooling. ( )

3 Write the scientific term:

1 It's a process that happens when the temperature of ice rises above 0°C. (..........)

2 It is a change in matter without any change in its structure. (..........)

3 It is a change in matter that is reversible. (..........)

4 It is the reverse process of freezing. (..........)

5 It is the measuring unit of temperature. (..........)

6 It measures how much energy the particles of a substance have. (..........)

7 It is a process in which matter changes from a gaseous state to a liquid state by cooling. (..........)

4 Complete the following sentences:

1 .... measures how much energy the particles in a substance have.

2 Water is liquid between .... °C and .... °C.

3 Water becomes solid when it is cooled .... 0°C.

4 When Adam places a bottle of water in the refrigerator, the particles inside water .... energy, so they move .... and change into ....

5 Melting is the change in the state of matter from .... into ....

6 .... happens when the temperature of ice rises above 0°C.

7 After the hot water vapor hits the cold surface, it .... into tiny water droplets.

8 Condensation is a process by which matter changes from a .... state to a .... state.

9 Condensation process is the opposite process of ....

5 Choose from column (A) what suits it in column (B):

A

Column (A)	Column (B)
1 Solids change into liquids.	a. Evaporation process
2 Liquids change into gases.	b. Freezing process
3 Gases change into liquids.	c. Melting process
4 Liquids change into solids.	d. Condensation process

1 .... 2 .... 3 .... 4 ....

B

Column (A)	Column (B)
1 In the melting process,	a. is the freezing point of water.
2 In the freezing process,	b. the particles lose energy and move slower.
3 0°C	c. the particles gain energy and move faster.

1 .... 2 .... 3 ....

C

Column (A)	Column (B)
1 When the temperature increases,	a. the particles slow down and move closer together.
2 When the temperature decreases,	b. the particles remain constant.
	c. the particles move and vibrate a lot more.

1 .... 2 ....

6 Answer the following questions:

A Study the following figures, then complete:

Figure (1)	Figure (2)

1. In figures (1) and (2), the particles inside the matter .... energy and move ....
2. Figure (1) represents the .... process, while figure (2) represents the .... process.
3. .... is the reverse process of figure (1).

B Complete the following diagram:

Solid — (1) .... → Liquid — (3) .... → Gas

Gas — (4) .... → Liquid — (2) .... → Solid

7 Give reasons for:

1. The melting process is considered a physical change.

....

2. Formation of water drops when water vapour touches a cold surface.

....

8 What happens if:

1. Thermal energy is absorbed by matter (concerning the motion of the particles)?

....

2. The particles of liquid water lose energy?

....

3. A liquid water container is placed in the freezer (concerning the new state formed and the energy of the particles)?

....

4. Water vapor touches a cold lid?

....



Lesson 3



Activity 6 Mixtures

Mixtures are everywhere around us. As most things in nature are mixtures, there are other things called compounds.



What is the difference between mixtures and compounds



Mixture	Compound
• A mixture is a form of matter made of two substances or more that don't combine chemically. • المخلوط: شكل من أشكال المادة يتكون من مادتين أو أكثر غير متحدتين كيميائيًا.	• A compound is a form of matter made of two or more substances that combine chemically. • المركب: شكل من أشكال المادة يتكون من مادتين أو أكثر متحدتين كيميائيًا معًا.
Examples	
• Salt water • Salad	• Water • Carbon dioxide gas

Properties of Mixtures

1. Each component of the mixture keeps its properties. For example, sugar does not lose its sweet taste when it is mixed with water.
2. The components do not combine chemically, so no new matter is formed.
3. The components can be separated physically by different methods.

خواص المخاليط:

1. تحتفظ مكونات المخلوط بخصائصها فمثلًا لا يفقد السكر مذاقه الحلو عند خلطه بالماء.
2. لا تتحد مكونات المخلوط كيميائيًا وبالتالي لا تتكون مادة جديدة.
3. يمكن فصل مكونات المخلوط بطرق فيزيائية مختلفة.

Unit 2

Mixtures can be made up of

Gaseous Materials

Atmosphere



Solid and Liquid Materials

Mixture of salt and water.



Solid Materials

Mixture of sand and rocks



Mixture of nuts



Mixture of salad





Important Notes:

- There are mixtures whose components can be seen by the eyes, such as a mixture of nuts.
- There are mixtures whose components can't be seen by the naked eye and you need special equipment to see them, such as the mixture of atmosphere.

Give a reason for...



- Atmosphere (air) is a mixture?

Because atmosphere (air) consists of different gases, such as nitrogen gas, oxygen gas, carbon dioxide gas, and other gases that don't combine chemically together.



1 Evaporation

- It's a process that can be used to separate materials that evaporate at different temperatures.

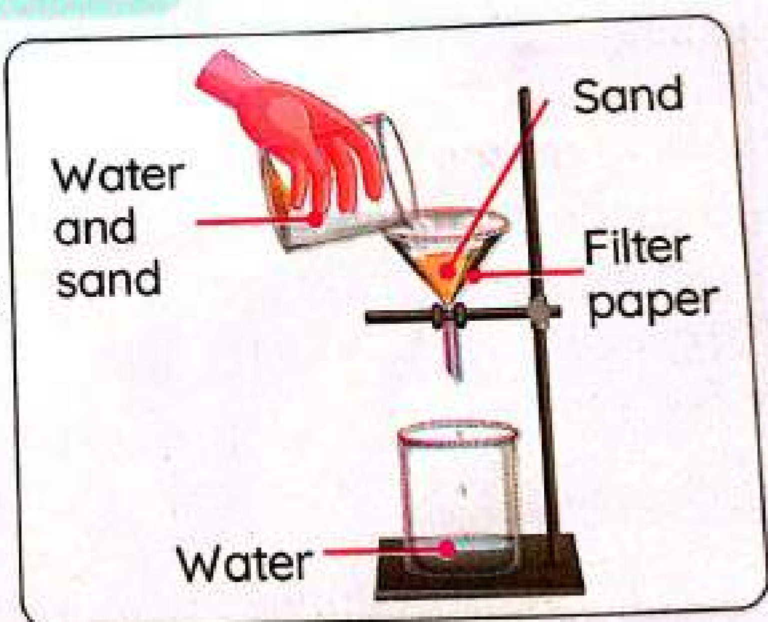


Example:

- Salt is separated from salt water.

2 Filtration

- A filter paper can be used to separate a mixture if one material has smaller particles than the other.



Example:

- Sand is separated from water.



Check your understanding?

Put (✓) or (✗):

1. Carbon dioxide gas that exists in air is considered a mixture. ( )
2. The components of salt water can be separated easily. ( )
3. We can see all components of all mixtures in nature. ( )
4. Most substances around us are mixtures. ( )



Activity 7 Mixing It Up with Mass

In this activity, you will explore what happens to masses of different substances when you mix them together.

في هذا النشاط، ستكتشف ماذا يحدث لكتل المواد المختلفة عند خلطها ببعضها.

Experiment 1 Forming Mixtures

Tools:

- Salt - pepper - oil - water - balance - spoon

Step (1):

- Mix 10 grams of salt and 10 grams of pepper, then find the mass of the mixture.

10 gm (Salt) + 10 gm (Pepper) = 20 gm (A mixture of salt and pepper)



Mixture (1)

Step (2):

- Mix 10 grams of water and 10 grams of oil with a spoon, then find the mass of the mixture.

10 gm (Water) + 10 gm (Oil) = 20 gm (A mixture of water and oil)



Mixture (2)

Step (3):

- Mix 10 grams of salt and 10 grams of water with a spoon, then find the mass of the mixture.

10 gm (Salt) + 10 gm (Water) = 20 gm (A mixture of salty water)





Mixture (3)

Observations:

1. The sum of the substances' masses before mixing is equal to the sum of their masses after mixing.
2. The properties of the substances don't change after mixing.

Conclusion:

- The properties of the substances in a mixture don't change. G.R
  Because they don't combine chemically.
- The masses of the substances don't change if they are mixed with other substances to form a mixture.

Experiment 2 Forming Compounds

Tools:

- Vinegar - backing soda - iodine - cornstarch - balance - spoon

Step (1):

- Mix 10 grams of vinegar and 10 grams of baking soda with a spoon, then weigh the mass of the mixture.

10 gm (Vinegar) + 10 gm (Baking soda) = 20 gm (A mixture of vinegar and baking soda)



Observations:

1. The sum of the substances' masses before mixing is equal to the sum of their masses after mixing.
2. The properties of the substances change after mixing, due to the formation of a gas that causes bubbles.

Unit 2

Step (2):

- Mix 10 grams of cornstarch and 10 grams of iodine with a spoon, then weigh the mass of the mixture.

10 gm + 10 gm = 20 gm

Cornstarch + Iodine (brown color) = A mixture of corn starch and iodine (dark blue color)



Observations:

1. The sum of the substances' masses before mixing is equal to the sum of their masses after mixing.
2. The properties of the substances change after mixing, due to the formation of a new compound with a dark blue color.

Conclusion:

» The properties of the substances in a compound change. G.R
Because they combine chemically.

» The masses of the substances don't change if they are mixed with other substances to form a compound.

Sum of masses of the substances (Before mixing) = Sum of masses of the substances (After mixing)

What happens if...



1. You mix a 10 gram of salt with a 10 gram of water (concerning their masses)?

The mass of the mixture equals the sum of salt and water masses before mixing = 20 grams.

2. You add vinegar to baking soda.

A gas is formed in the form of bubbles.

3. You add some iodine droplets to cornstarch or a piece of bread.

Iodine's color turns into dark blue.

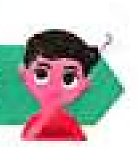
Give a reason for...



- The properties of vinegar and baking soda change on mixing them together.

Due to the formation of a new substance (compound).

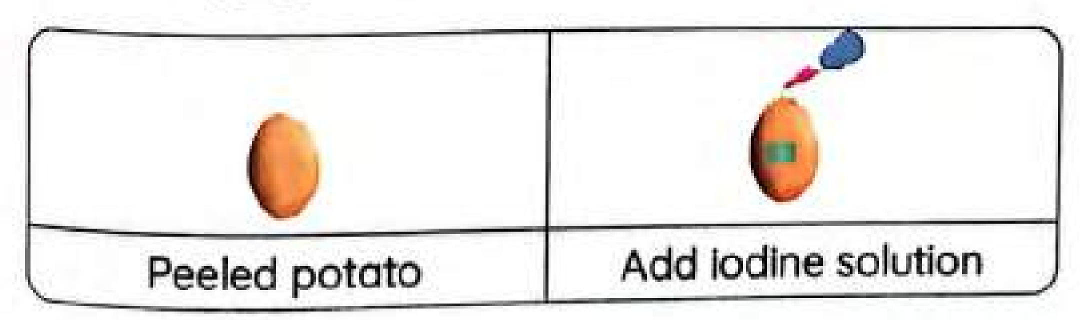
Check your understanding?



» Choose the correct answer:

1. On mixing 15 grams of salt with an amount of sugar, the mass of the mixture becomes 25 grams, so the mass of sugar is .... (40 - 10) grams.

2. In the following figure:



The potato contains .... (salt - starch), because the iodine's color turns into .... (dark blue - dark red).

Exercises on Lesson 3

1 Choose the correct answer:

1. Salt can be separated from salty water by ....
   a. melting
   b. evaporation
   c. freezing
   d. condensation

2. All the following are mixtures, except ....
   a. salty water
   b. fruit salad
   c. atmosphere
   d. carbon dioxide gas

3. All the following examples represent mixtures containing solid materials only, except ....
   a. fruit salad
   b. orange juice
   c. nuts mixture
   d. sand and rocks

4. All the following are properties of mixtures, except that ....
   a. each material inside them keeps its properties
   b. materials inside them don't combine together
   c. the matter changes into a new one
   d. materials can be separated easily from them

5. Atmospheric air is considered a ....
   a. compound
   b. mixture of solid and liquid materials
   c. mixture of solid materials
   d. mixture of gas materials

6. .... is used to separate mixtures of materials having different sizes of particles.
   a. Evaporation
   b. Freezing
   c. Condensation
   d. Filtration

7. We can separate a mixture of water and sand by ....
   a. condensation
   b. filtration
   c. evaporation
   d. freezing

8. If three materials are mixed, each of them is 10 g, the mass of the mixture is .... g.
   a. 10
   b. 9
   c. 11
   d. 30

9. When we add 2 g of water to 2 g of salt, ...
   a. the properties of the substances change
   b. the total mass equals 4 g
   c. the total mass equals 5 g
   d. a new compound is formed
10. After mixing baking soda and vinegar, ...
   a. the masses of the substances before mixing are equal to their masses after mixing
   b. a new matter will be formed
   c. the properties of the substances will change
   d. all the previous answers
11. When we add water to oil and mix them together, ...
   a. the properties of the substances don't change
   b. a new compound is formed
   c. the total mass increases
   d. the total mass decreases

2 Put (✓) or (✗):

1. The components of the mixture cannot be separated after mixing them. ( )
2. Air is considered an example of a compound. ( )
3. The materials that form a compound combine chemically together. ( )
4. A mixture consists of two or more materials. ( )
5. Filtration can separate a mixture if the materials have the same size of particles. ( )
6. The properties and mass of water change after being mixed with oil. ( )
7. After adding vinegar to baking soda, gas bubbles are formed. ( )
8. The blue color that is formed when we add cornstarch and iodine is due to the formation of a new compound. ( )
9. After mixing salt and water, the properties of the substances change. ( )
10. The mass remains constant before and after mixing different materials. ( )

3 Write the scientific term:

1. It's a mixture of different gases that exists everywhere around us. (..................)
2. It's a form of matter made up of two substances or more that are chemically combined. (..................)
3. It's a separation method that is used to separate sand from water. (..................)
4. It's a separation method that is used to separate salt from salty water. (..................)
5. It's a form of matter made up of two substances or more that are not chemically combined. (..................)

4 Complete the following sentences:

1. .... and .... are examples of mixtures.
2. We use .... method to separate a mixture which has materials with smaller particles than the particles of other materials.

5 Mention the way of separation of the following mixtures:

1. Separation of salt from water (..................)
2. Separation of sand from water (..................)

6 Give an example of a mixture that is made up of:

1. Solid materials. (..................)
2. Solid and liquid materials. (..................)
3. Gaseous materials. (..................)

7 Choose from column (A) what suits it in column (B):

A

Column (A)	Column (B)
1 A mixture of gases	a. Sand and small rocks
2 A mixture of liquids and solids	b. The Earth's atmosphere
3 A mixture of solids	c. Salty water

1 .... 2 .... 3 ....





Column (A)

1. Filtration
2. Evaporation

Column (B)

a. is used to separate salt from salty water.
b. is used to separate sand from water.
c. is used to separate oil from water.

1 .... 2 ....

8 Answer the following questions:

The opposite figure shows a method for the separation of mixtures.

1. This method is called ....
2. We use it to separate .... from water.



9 Give reasons for:

1. Filtration is used to separate sand from water.
2. Atmosphere is considered a mixture.
3. The components of the mixture can be separated after mixing them.

10 What happens if:

1. We add vinegar to baking soda?
2. We add 5 g of water to 5 g of oil (concerning the total mass after mixing)?

11 Look at the following figures, then choose the correct answer:

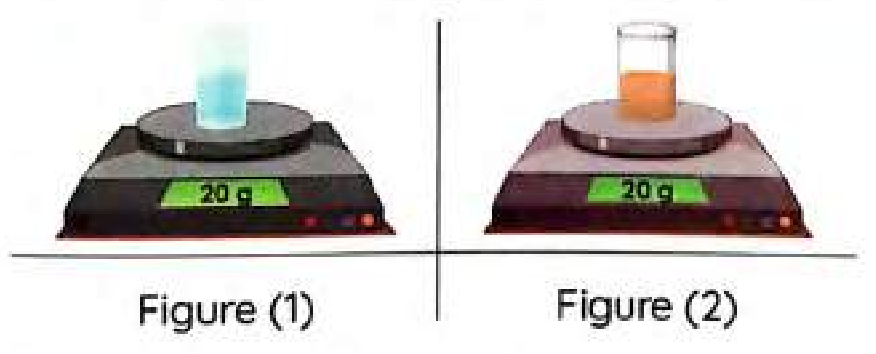


Figure (1) Figure (2)

When we mix the water and oil together.

1. The reading of the balance after mixing is (20 – 40) grams.
2. The properties of the substances (change – don't change) after mixing.

Concept 3

Lesson 4



Unit 2

 Activity 8 Physical Changes in Our Lives

» Changes occur to the matters around us every day.

Physical change • It is a change in the shape, size, or even state of the matter without changing its structure or its properties.

التغير الفيزيائي: هو تغير في شكل أو حجم أو حالة المادة بدون حدوث تغير في تركيب المادة أو خواصها.

Examples:

1 Cutting cloth





قص القماش

2 Cutting vegetables to make a salad



تقطيع الخضراوات لصنع السلطة

3 Melting of wax



انصهار الشمع

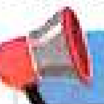


4 Shaping of metals and wood





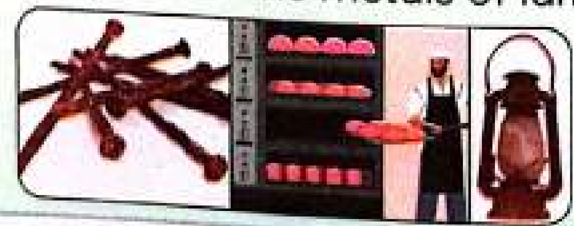
تشكيل المعادن والخشب



Important Notes:

- Some changes that occur to the matter are not considered physical changes because a new substance is formed with new properties, such as:

1. Burning paper to form ash.
2. Mixing flour, water, sugar, and yeast to make bread.
3. Formation of black spots on the metals of lamps called "tarnish".






Activity 9 Chemical Changes

» When two substances react to form a new substance, this is called a "chemical change".

Chemical change

It's a change in the matter and its structure, producing new matter with different properties.

التغير الكيميائي: هو التغير الذي يحدث للمادة وتركيبها وينتج عنه مادة جديدة لها خصائص جديدة.

Examples of Chemical Changes

1 Iron rusting:



- Iron, oxygen, and water combine to form rust.
- Rust is a reddish, thin layer called iron oxide.

• الصدأ: يتحد الحديد مع أكسجين الهواء لتكوين طبقة صدأ (قشرة حمراء اللون تسمى أكسيد الحديد).

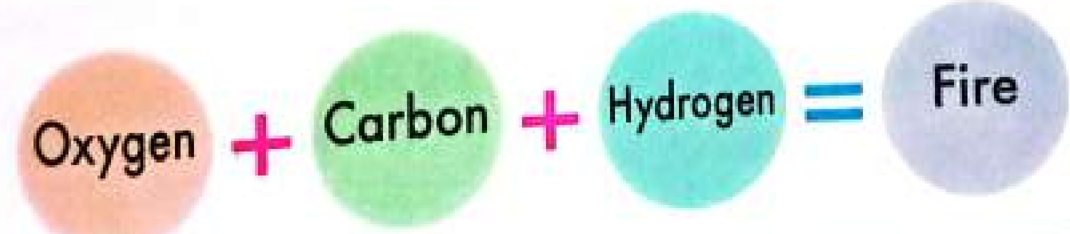
Iron + Oxygen + Water = Rust (Iron oxide)

2 Burning reaction:



- Oxygen combines with carbon and hydrogen; they release heat that can start a fire.
- The fire can change wood into ash.

• الاحتراق: اتحاد غاز الأكسجين مع الكربون والهيدروجين ينتج عنه حرارة قد تسبب نشوب حريق مثل احتراق الخشب وتحوله لرماد.



3 Mixing vinegar with baking soda:



- Mixing vinegar with baking soda produces gas bubbles.

• إضافة الخل لبكربونات الصودا ينتج فقاقيع غاز.

4 Digestion of food:



- Chemicals inside your body help you digest food.

• **هضم الطعام:** المواد الكيميائية داخل جسمك تساعدك على هضم الطعام.

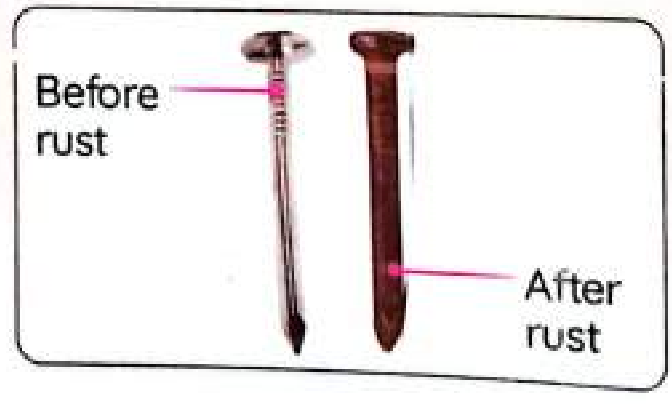
Important Note:

- Unlike physical changes, chemical changes are **not easily reversed**.

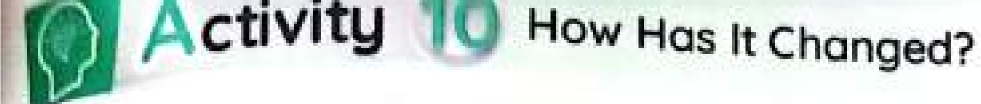
• على عكس التغيرات الفيزيائية، لا نستطيع إعادة المادة إلى حالتها الأولى قبل التغيرات الكيميائية.

Science Facts

- Rust is usually red in color and is formed on iron only, while tarnish is a thin layer that is often black or gray and is formed on many different metals, such as silver.







Activity 10 How Has It Changed?

Physical Change	Chemical Change
① Change in the: shape, color, or state of the matter. ② No new substance is formed. ③ It can be reversed.	① Change in the structure of the matter. ② A new substance is formed with different properties. ③ It can't be reversed easily.

Concept 3

Physical changes include a change in

State	Shape	Size	Color
Water evaporation	Coiling a wire to form a spring	Cutting wood	Adding a few drops of food coloring to wate

Chemical changes include formation of new matter



Burning bread in a toaster	Frying an egg	Adding iodine to cornstarch forming a new substance with a dark blue color	Smelling the bad odor of milk

» Read each scenario and observe each figure, then decide whether it describes a physical or chemical change and determine the evidence.

Scenario	Figure	Change	Evidence (Reason)
1 Iron nail rusting			
2 Shaping gold			
3 Sand flowing in an hourglass			
4 Burning paper			
5 Melting butter			
6 Making bread			
7 Making fruit salad			

Exercises on Lesson 4

1 Choose the correct answer:

1. When a physical change happens, the ...... of the matter doesn't change.
   a. color   b. shape   c. structure   d. state
2. A mixture of salt and pepper consists of ....
   a. two liquid materials   b. two solid materials
   c. two gaseous materials   d. different gases
3. A mixture consists of substances that are physically combined together, which means ....
   a. they react together   b. they don't react together
   c. they cannot be separated   d. they produce a new compound
4. All the following are considered physical changes, except ....
   a. cutting paper   b. burning wood
   c. making salad   d. melting wax
5. .... is/are considered chemical change(s).
   a. Mixing vinegar with baking soda
   b. Rusting of iron
   c. Digestion
   d. All the previous answers
6. When we freeze water, ...
   a. its structure changes   b. a chemical change happens
   c. its state changes   d. its mass changes
7. .... is considered a chemical change of matter.
   a. Cutting paper   b. Burning paper
   c. Melting wax   d. Coloring a paper
8. All the following are the properties of the physical change of matter, except the change in ....
   a. shape   b. state   c. size   d. structure

9 All the following are about chemical changes, except ....

a. the formation of new substance

b. that they cannot be easily reversed

c. the occurrence of reactions

d. that matter's structure doesn't change

10 All the following are chemical changes, except ....

a. melting wax

b. tarnishing

c. making bread

d. food digestion

11 Mixing .... and .... is considered a physical change.

a. vinegar – baking soda

b. iron – oxygen

c. sugar – water

d. yeast – dough

12 .... is the reddish layer of iron oxide.

a. Ash b. Rust c. Tarnish d. Melted wax

13 Mixing baking soda and vinegar produce ....

a. light b. heat c. ash d. gas bubbles

14 Oxygen combines with carbon and hydrogen to produce ....

a. rust b. ash c. fire d. gas bubbles

15 Rust is a chemical substance called ....

a. iron b. copper c. iron oxide d. copper oxide

2 Put (✓) or (✗):

1 Air is a mixture of some gases. ( )

2 A mixture of oil and water consists of two solid materials mixed together. ( )

3 Physical change can change the shape, size, or state of matter. ( )

4 Cutting off clothes is a physical change. ( )

5 Coiling wire to form a spring is an example of physical changes. ( )

6 Chemical changes are easily reversed. ( )

7 When oxygen combines with carbon and hydrogen, they release heat that can start a fire. ( )

8. Frying an egg for breakfast is a physical change. ( )
9. The bad smell of milk after leaving it out of the fridge is an example of physical changes in milk. ( )
10. Coloring a paper is considered a chemical change. ( )
11. When iron nails rust, they produce a new substance with new properties. ( )
12. The formation of unexpected color or gas bubbles indicate that chemical changes happened. ( )

3 Write the scientific term:

- It is a flaky, reddish layer of iron oxide. (..................)

4 Complete the following sentences:

1. Physical changes can change the ...., ..., and .... of matter.
2. Evaporation of water is considered a .... change.
3. Rust is formed when iron reacts with .... and ....
4. When vinegar is mixed with ...., gas bubbles appear.
5. Burning paper is considered a .... change, while cutting paper is considered a .... change.
6. Iron and oxygen combine to form ....
7. When .... combines with carbon and hydrogen, they release heat that can start a fire.
8. The fire can change wood into ....
9. When mixing iodine with cornstarch, ... color is formed.

5 Cross out the odd word:

1. Burning wood – Iron rust – Melting wax – Frying eggs (..................)
2. Digestion – Formation of ash – Evaporation of water – Making bread (..................)

6 Choose from column (A) what suits it in column (B):

A

Column (A) Material	Column (B) Result
1 Ash	a. are produced by adding vinegar to baking soda.
2 Rust	b. is black spots on metals of lamps.
3 Gas bubbles	c. is a flaky, reddish layer of iron oxide.
4 Tarnish	d. is produced from burning wood.

1 .... 2 .... 3 .... 4 ....

B

Column (A)	Column (B)
1 When oxygen reacts with carbon and hydrogen,	a. a layer of iron oxide is formed.
2 When iron reacts with oxygen and water,	b. gas bubbles are formed.
3 When vinegar reacts with baking soda,	c. it starts a fire.

1 .... 2 .... 3 ....

7 Give reasons for:

1. The formation of a bad odor of milk after days of leaving it out of the fridge.
2. When mixing vinegar with baking soda, bubbles appear.
3. Baking bread is a chemical change.

8 What happens if:

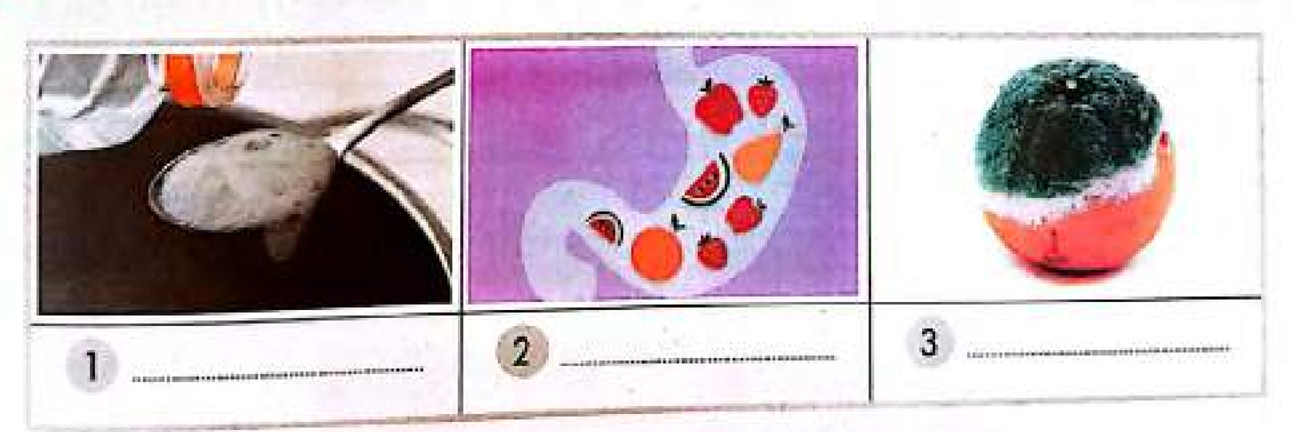
1. Iron reacts with oxygen and water?
2. You add iodine to cornstarch?
3. Oxygen combines with carbon and hydrogen?
4. You add vinegar to baking soda?
5. You leave a cup of milk out of the fridge for a long time?
6. You leave an iron nail in the rain?



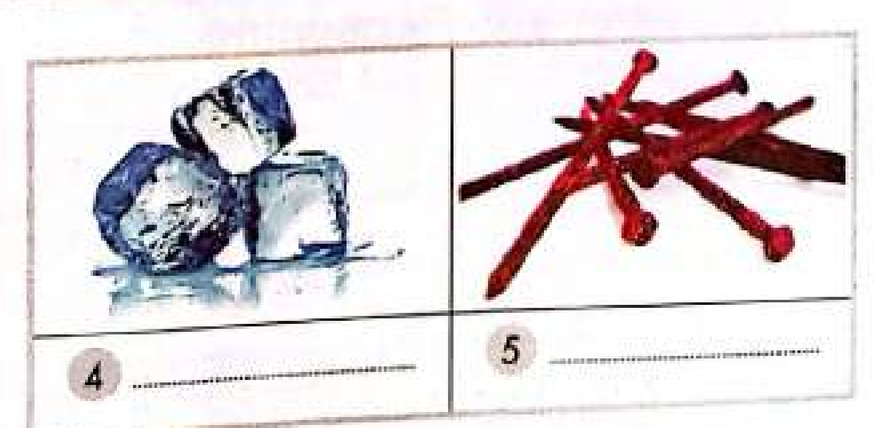
9 Read the following scenarios, and classify the changes as physical or chemical:

Scenario	Change
1 A straight piece of wire is coiled to form a spring.	....
2 The bread is black, and the kitchen is full of smoke.	....
3 A few drops of food coloring are added to water.	....
4 You melt some butter to make a cake.	....
5 Fireworks are exploding in the air.	....
6 You paint a piece of wood.	....
7 Water evaporates from the surface of the Nile.	....
8 Sand flows in an hourglass.	....
9 You see chunks in the milk and smell a bad odor.	....

10 Study the following figures, then classify the changes as physical or chemical:



1 .... 2 .... 3 ....



4 .... 5 ....

Lesson 5



Activity 11 Record Evidence Like a Scientist: Melting Matter



Unit 2

- Now that you have learned about changes of matter, how can you describe melting matter now?
- Look at the Can You Explain? You first read this question at the beginning of the concept.



Question:

- What happens to the mass of a substance when it is heated, cooled, or mixed with other substances?

My Claim:

____

____

Evidence:

____

____

____

____

Scientific Explanation with Reasoning:

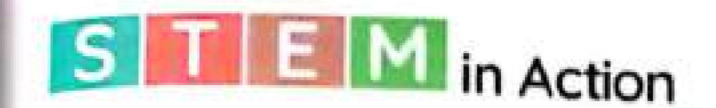
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STEM in Action

Activity 12 Plenty of Water, but None to Drink



» Many people around the world cannot reach fresh water although 70% of the Earth's surface is covered with water but most of them are salt water, such as water of ocens and seas.

- كثير من الناس حول العالم لا يستطيعون الوصول للمياه العذبة على الرغم من احتواء كوكب الأرض على 70 % من المياه ولكن أغلبها مياه مالحة مثل مياه البحار والمحيطات.

A Tricky Mixture

» Seawater and ocean water are a mixture of:

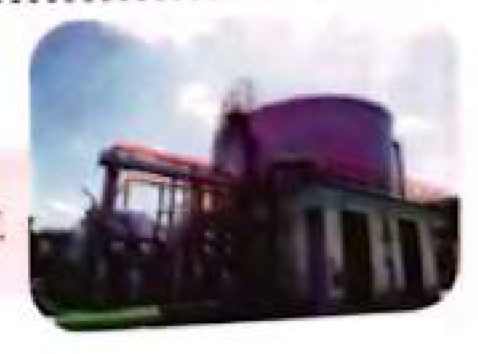
Water	Salt	Other minerals	Gases	Living organisms	Dead organisms

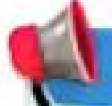
- Drinking salty water makes a person dehydrated, or lose water faster.
- The only water that a thirsty person needs is fresh water.
- People need fresh water to drink, so they use the desalination process.

- شرب المياه المالحة قد يصيب الشخص بالجفاف أو فقدان الماء بشكل أسرع.
- المياه العذبة هي المياه الوحيدة التي يحتاجها الإنسان ليروي عطشه.
- يحتاج الناس إلى مياه عذبة للشرب؛ لذا فهم يقومون بعملية تحلية المياه.

Desalination

It is the process of removing salts from water.





Important Note:

- Egypt has 80 desalination plants.

- تمتلك مصر ٨٠ محطة تحلية مياه.

The desalination process takes place in two steps, which are:

1 Filtration:

- Filtering removes any large materials, such as pieces of seaweed, shells, and fish.
- The water, salts, minerals, and gases pass through the filter.
- The mixture is still undrinkable.

Filter paper



• تقوم عملية الترشيح بالتخلص من المواد الكبيرة مثل الأعشاب البحرية والأصداف والأسماك.

• المخلوط الناتج بعد هذه العملية به أملاح و معادن بالإضافة إلى الماء. • المخلوط الناتج ما زال غير صالح للشرب.



2 Evaporation:

1 While water is boiling, the vapor rises out of the mixture, but the salts and other minerals stay behind.

2 Trap the rising vapor using a cold surface to turn it into fresh water by condensation.

3 The water in the beaker is safe to drink now.

Cold glass sheet
Water vapor
Water drops



• أثناء غليان ماء البحر، يتصاعد بخار الماء عن المخلوط وتترسب الأملاح والمعادن في القاع.

• يمكن تجميع البخار المتصاعد بواسطة استخدام سطح بارد لتحويل البخار إلى ماء نقي عن طريق عملية التكثيف.

• الماء المتجمع في الإناء الآن يكون صالحًا للشرب.

Disadvantages of Desalination

1 It requires a lot of energy. 2 It is very expensive.

3 It may harm marine organisms, as

a. Small marine organisms may be sucked up with the water.

b. The water that contains big amounts of salts is pumped back into the seawater.

عيوب عملية التحلية:

1 تتطلب الكثير من الطاقة. 2 عالية التكلفة. 3 قد تضر الكائنات البحرية حيث:

أ. يتم امتصاص الكائنات البحرية الصغيرة مع المياه. ب. يتم إرجاع المياه شديدة الملوحة مرة أخرى لمياه البحر.

Exercises on Lesson 5

1 Choose the correct answer:

1. The .... process of seawater removes pieces of seaweed, shells, and fish.
   a. boiling b. freezing c. filtration d. condensation
2. From the advantages of the desalination process is that ....
   a. it requires a lot energy
   b. it is very expensive
   c. it harms small marine organisms
   d. it extracts fresh water from the seawater
3. Oceans and seas cover about .... of the Earth's surface.
   a. 50% b. 70% c. 90% d. 95%
4. The desalination process of seawater includes all the following processes, except ....
   a. evaporation b. melting c. condensation d. filtration

2 Put (✓) or (✗):

1. The desalination of water requires a lot of energy. (   )
2. The only water that a thirsty person needs is salty water. (   )
3. We cannot separate salt from the ocean's water. (   )
4. Sea and ocean water are considered a mixture. (   )
5. We can separate salt from seawater by filtration. (   )
6. When the water vapor is cooled, It changes into liquid water. (   )

3 Write the scientific term:

1. It is a process of removing salt from seawater. (........)
2. It is a process which is used to remove large materials, such as seaweed and shells from seawater. (........)

4 Complete the following sentences:

1. We can use .... and .... processes in ocean water desalination.
2. We can remove large materials, such as seaweed and shells from ocean water by ....
3. When the water vapor is cooled, it changes into ....
4. We can separate salt from water by ....

5 Give reasons for:

1. The desalination of seawater has a great importance.

....

2. Desalination process has some disadvantages.

....

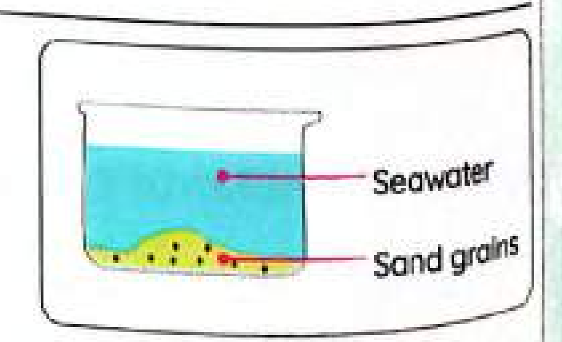
6 What happens if:

- You boil seawater?

....

7 If you have a filter paper, a clean glass sheet and a flame (burner), what is the correct sequence for the processes that occur to the sample in the following figure to obtain a drinkable water?

a. Evapration – filtration – condensation
b. Evapration – condensation – filtration
c. Filtration – evapration – condensation
d. Filtration – condensation – evapration



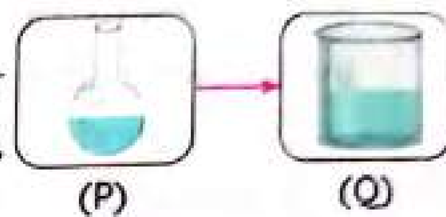
Assess Your Learning

School Book Questions on Unit 2

Choose the correct answer:

1. Which substance(s) in the following (water vapor, oxygen and nitrogen) can be compressed (squeezed)?
   a. Water vapor and oxygen only b. Oxygen and nitrogen only
   c. Water vapor and nitrogen
   d. Water vapor, oxygen and nitrogen

2. On transferring an amount of oil from container (P) to container (Q) as in the opposite figure, which change of the following may occur?



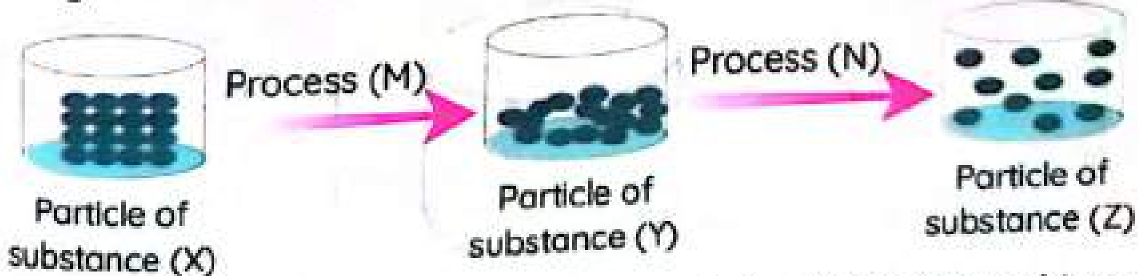
   a. A change in volume b. A change in mass
   c. A change in shape d. A change in temperature

3. Ice cubes melt when they gain .... energy.
   a. electrical b. light c. sound d. thermal

4. .... is the process in which water changes into ice.
   a. Melting b. Freezing c. Evaporation d. Condensation

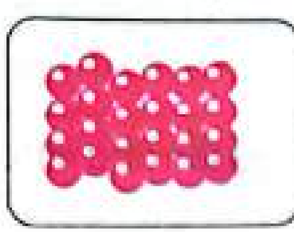
5. Choose the wrong sentence in the following sentences:
   a. Matter exists in three states.
   b. Matter changes from a state to another.
   c. A new substance is produced from the chemical reaction.
   d. Ice is heavier than water.

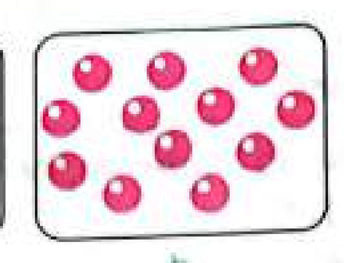
6. Study the following diagram, then choose the correct answer:

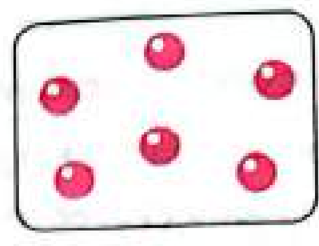


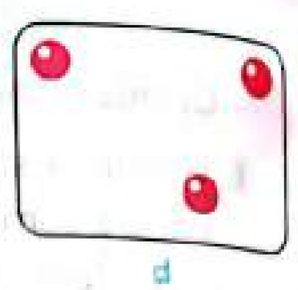
   a. (X) is a solid state – (Z) is a gaseous state – (M) is the melting process.
   b. (X) is a solid state – (Y) is a liquid state – (N) is the freezing process.
   c. (Y) is a liquid state – (Z) is a solid state – (N) is the evaporation process.
   d. (Y) is a liquid state – (Z) is a gaseous state – (M) is the condensation process.

7 The attraction force between the particles is the greatest in figure (..................).


a

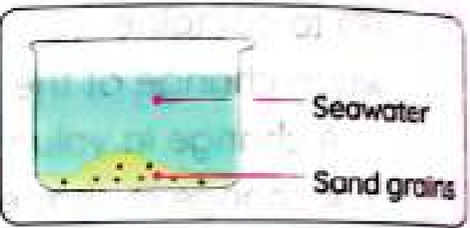

b


c


d

8 If you have a filter paper, a clean glass sheet and a flame (burner), what is the correct sequence for the processes that occur to the sample in the following figure to obtain a drinkable water?

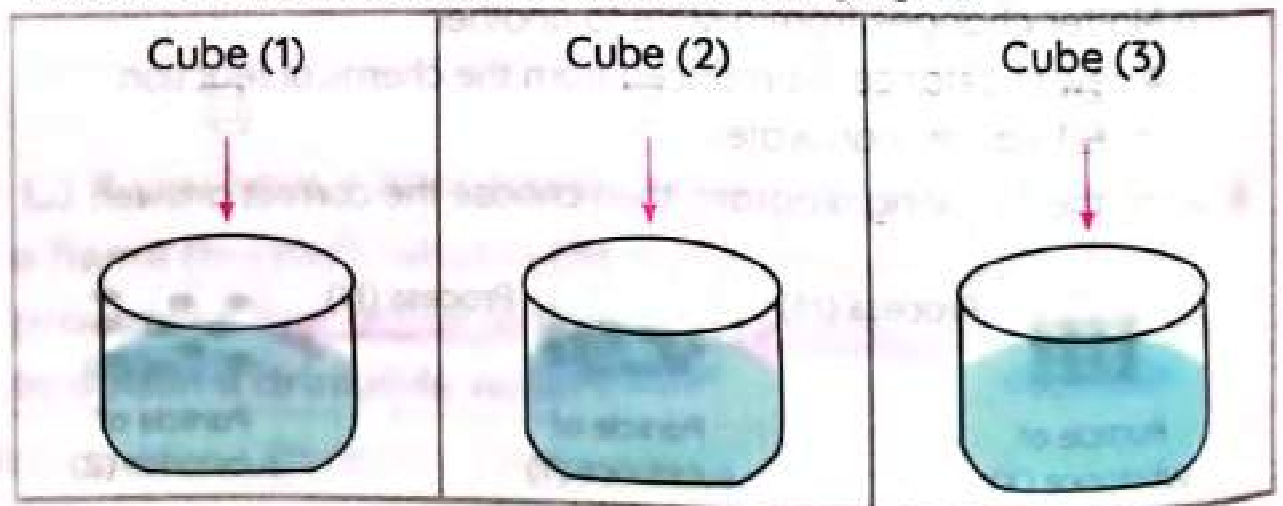
a. Evaporation – filtration – condensation
b. Evaporation – condensation – filtration
c. Filtration – evaporation – condensation
d. Filtration – condensation – evaporation



9 Which of the following is considered an evidence of a chemical change?

a. Evolving of smoke
b. Crushing nuts
c. Squeezing a balloon filled with air
d. Melting a piece of wax

10 A pupil has three ice cubes with different volumes and three similar containers, and the pupil put each ice cube in a container containing the same amount of water as in the following figure:



What happens to the ice cubes when they are put in water?

a. Cubes (1), (2) and (3) sink.
b. Cubes (1), (2) and (3) float.
c. Cube (1) floats, and cubes (2) and (3) sink.
d. Cubes (2) and (1) float, and cube (3) sinks.


Projects

Project on Unit 1

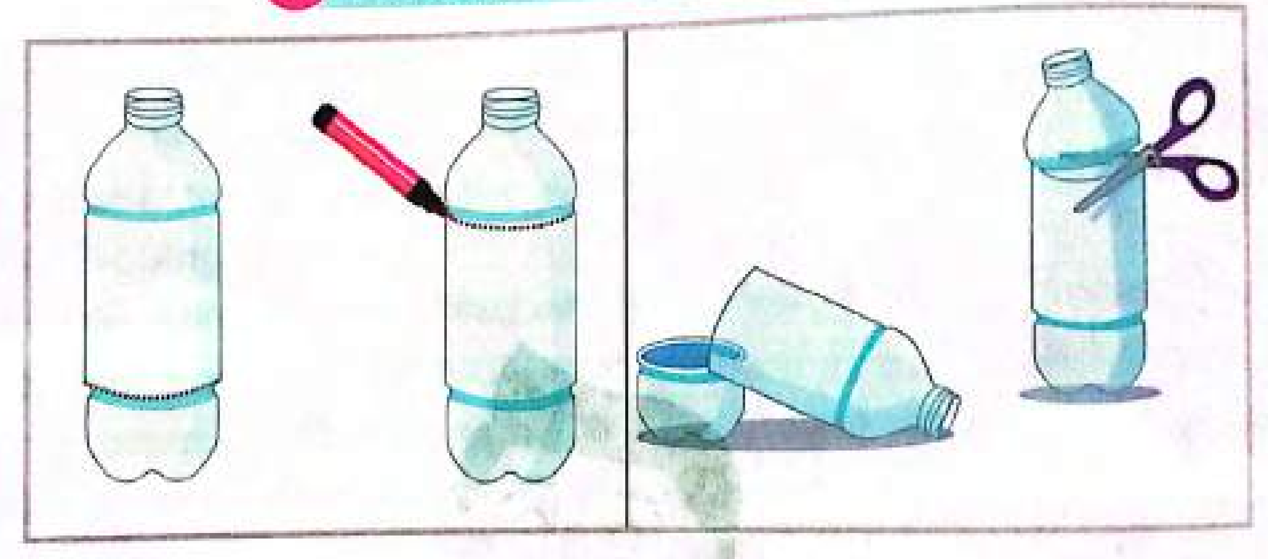
Build a Miniature Ecosystem

» You will build a miniature ecosystem using recycled plastic bottles.

» After completing the project, you will discover:

- The interaction between living organisms and nonliving things.
- The role of each living organism in the ecosystem.

A Building a miniature ecosystem



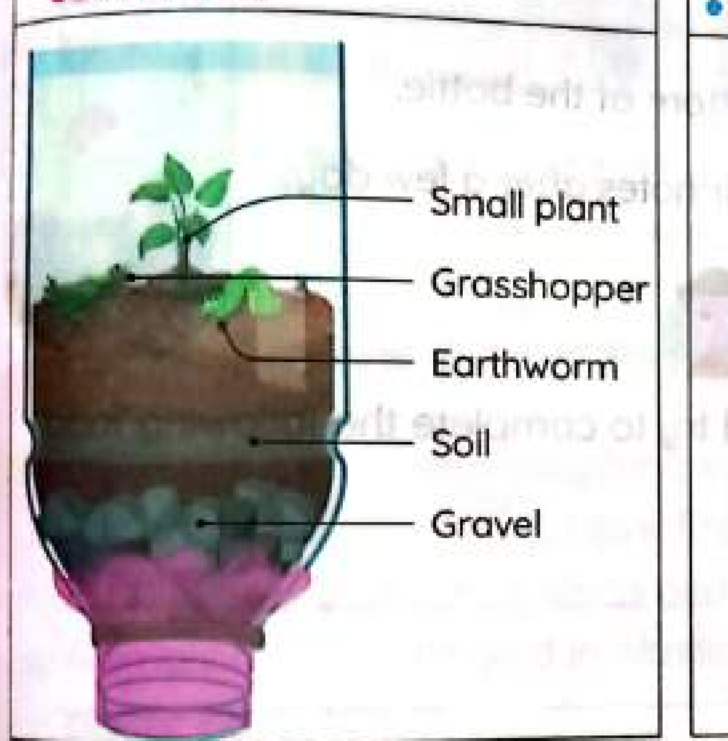
Steps:

1. Collect two empty plastic bottles and clean them with water and soap.
2. Cut the two bottles using scissors as shown in the previous figure.
3. We will start to build two miniature ecosystems, as follows:

- Bottle (A): Represents the ecosystem on the land and it is called the "Terrarium ecosystem".
- Bottle (B): Represents the marine ecosystem and it is called the "Aquarium ecosystem".

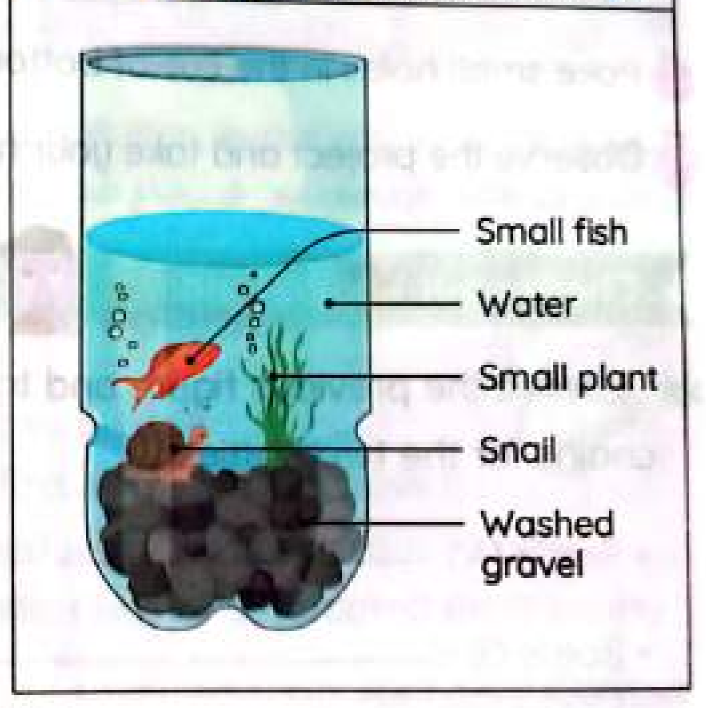
Bottle (A) Terrarium Ecosystem

- Put a layer of gravel at the bottom.
- Put a layer of soil over the gravel.
- Put a small plant in the soil.
- Put a grasshopper and an earthworm.

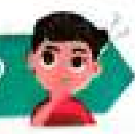


Bottle (B) Aquarium Ecosystem

- Put a layer of washed gravel at the bottom.
- Pour distilled water into the bottle. (leaving an empty space from the top)
- Put a small plant in the gravel.
- Put a very small fish and a snail.



Check your understanding?



» Observe the two previous figures, and then try to complete the following table:

P.O.C	Nonliving Things	Producer	Consumer	Decomposer
Terrarium Ecosystem				
Aquarium Ecosystem				

B Modeling the flow of energy



Steps:

1. Invert the upper part of bottle (A) into the lower part of bottle (B).
2. Place the project in a sunny place.
3. Close the upper part of the bottle using the cut-of bottom of the bottle.
4. Poke small holes in the cut-of bottom of the bottle.
5. Observe the project and take your notes after a few days.

Check your understanding?

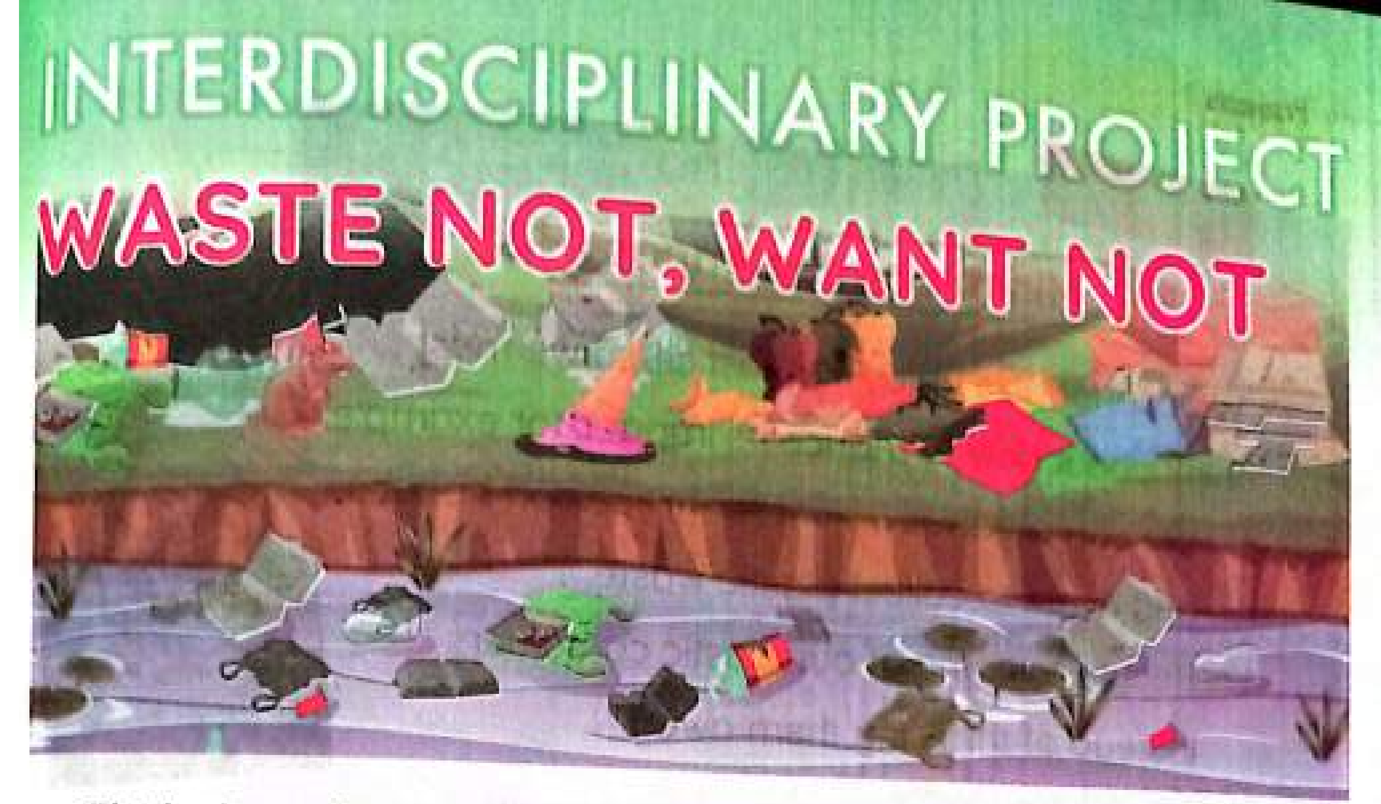
- Observe the previous figure and try to complete the following food chains for the two bottles:
  - Bottle (A): .... → .... → ....
  - Bottle (B): .... → .... → ....

Observations:

- Energy chains for these miniature ecosystems can describe:
  - How energy transfers between living organisms.
  - The role of each living organism.
- The Sun is the main source of energy for all living organisms.
- Producers can make their own food through photosynthesis process.
- Consumers depend on other living organisms to get energy.
- Decomposers recycle the energy in the dead things to the ecosystem.

INTERDISCIPLINARY PROJECT

WASTE NOT, WANT NOT



- Think about the problem of plastic pollution, especially in waterways.

- فكر في حل لمشكلة التلوث البلاستيكي خصوصًا في المجاري المائية.

How Bad Is Plastic Pollution?



- People use plastic for everything such as:
  1. Storing food
  2. Manufacturing medical devices.
- Plastics, as one form of discarded waste, is dangerous to animals.
- Animals can get tangled in plastic rings or suffocated from eating plastic parts.

خطورة التلوث بفعل المواد البلاستيكية:

- يستخدم الناس البلاستيك في كل شيء مثل: ١- تخزين الطعام. ٢- صناعة الأجهزة الطبية.
- تعتبر النفايات البلاستيكية خطيرة بشكل خاص على الحيوانات.
- يمكن أن تتشابك الحيوانات في حلقات بلاستيكية ويمكن أن تختنق من ابتلاع أجزاء بلاستيكية.

Plastics in Egypt

- In the Nile river, scientists have found that over 75 % of the fish have swallowed plastic from the pollution caused by humans.
- Not everything sent to a recycling facility gets recycled because many of these items are contaminated, and therefore cannot be recycled.

مشكلة النفايات البلاستيكية في مصر:

وجد العلماء أن أكثر من ٧٥ ٪ من الأسماك في نهر النيل تبتلع البلاستيك من التلوث الذي سببه الإنسان.
للأسف لا نستطيع إعادة التدوير لكل المخلفات البلاستيكية نظرًا لأن الكثير منها يكون ملوثًا.

Minimizing the Impact



- We cannot give up using plastics, so we must think about how to reduce its impact, for example:
  1. We can organize volunteer groups on beaches and rivers to collect plastic waste.
  2. Recycling some of our plastic containers instead of throwing them away.

الحد من الآثار السلبية للتلوث بفعل المواد البلاستيكية:

- لا نستطيع الاستغناء عن البلاستيك، لذلك يجب التفكير في كيفية تقليل أضراره، فمثلًا:
  - يمكننا تنظيم فرق من المتطوعين على الشواطئ والأنهار؛ لجمع المخلفات البلاستيكية.
  - نعيد استخدام بعض الحاويات البلاستيكية التي لدينا بدلًا من التخلص منها.

Examples of recycling plastics that can help you



Project on Unit 2

Slippery Sands

» How did the ancient Egyptians move very heavy, large blocks of stone during the building of the Pyramids or moving too heavy statues?

• Scientists and historians discovered the answer in the artworks of ancient Egyptians.

هل تساءلت يومًا كيف تمكن المصريون القدماء من تحريك كتل حجرية ضخمة عند بناء الأهرامات أو نقل التماثيل الضخمة؟

• قام العلماء والمؤرخون باكتشاف اللوحات المصرية القديمة للوصول للحل.

Historians

• Historians have looked at the paintings of ancient Egyptians for clues.
• In the painting, a person is seen pouring a liquid in front of the sleds.
• For years, historians believed that this was related to a holy cleansing ceremony.



Moving a Large Statue

المؤرخون:
• نظر المؤرخون إلى اللوحات الفنية المصرية القديمة.
• يظهر في الصورة رجل يقوم بسكب سائل ما أمام الزلاجات التي تحمل الصخور.
• اعتقد المؤرخون أن هذا الرجل يقوم بعمل أحد طقوس التطهير للاحتفال بنقل التمثال.

Scientists

• Scientists looked at the paintings in a different way.
• Scientists had a theory that maybe they were adding water to the sand to make it more slippery and decrease the friction force so they could move the statue more easily.



Building the Pyramids

العلماء:
• نظر العلماء إلى اللوحات بطريقة مختلفة.
• يرى العلماء أن المصريين القدماء يضيفون الماء إلى الرمل لجعل الرمل أكثر انزلاقًا ولتقليل الاحتكاك؛ حتى يتمكنوا من تحريك التمثال بسهولة أكثر.



Properties of Sand:

» Why would adding water reduce the friction?

- Sand particles are often rough with strong angles and edges.
- When water is added to the sand, it forms bridges that connect the particles to one another. This is why damp sand sticks together and you can shape and curve it.
- You can even make sandcastles with it. If you pack down wet sand, water will drain quickly out of it, creating a more solid clump.

خصائص الرمل:

- جزيئات الرمل خشنة ولها زوايا وحواف قوية.
- عندما يضاف الماء إلى الرمل، ترتبط الجسيمات ببعضها أكثر؛ ولهذا فإن الرمال الرطبة تلتصق ببعضها، ويمكنك تشكيلها وتقويسها.
- يمكنك صنع القلاع الرملية منها: إذا ضغطت على الرمل المبلل، فسوف يتم تصريف الماء منه بسرعة؛ مما يؤدي إلى أن تصبح الرمال أكثر صلابة.



Idea:

» You will investigate how water can be used to make sand more slippery.

» You will explain how water can affect the properties of sand.

الفكرة:

- سوف تستكشف كيف يجعل الماء الرمال أكثر انزلاقًا؛ لفهم كيف يمكن أن يؤثر الماء على خصائص الرمل.

Materials:

- Sand - water - string - measuring cup - balance - tray - heavy wood block - bottle (optional)

المواد المستخدمة:

- رمل ـ ماء ـ حبل ـ مخبار مدرج ـ ميزان ـ صينية ـ أجسام خشبية ثقيلة أو قوالب طوب ـ زجاجة.

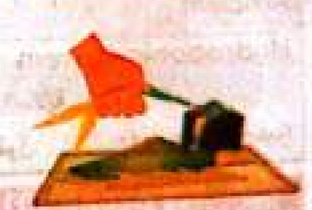
Project Steps:

1. Place the wooden block on the tray over the sand.
2. Tie a thread around the block.
3. Try to drag the block over the sand and record the results.
4. Add 100 mL of water to the sand.
5. Try to pull the block again.
6. Record the results.



التنفيذ:

1. ضع الكتلة الخشبية على الصينية فوق الرمال.
2. اربط خيطًا حول الكتلة.
3. حاول سحب الكتلة فوق الرمال وسجل النتائج.
4. أضف 100 مل من الماء إلى الرمل.
5. حاول سحب الكتلة مرة أخرى.
6. سجل النتائج.



Test:

- Repeat the steps with the different blocks used.
- Increase the percentage of water added to the sand and repeat the steps again.

الاختبار:

- كرر الخطوات مع اختلاف الكتل المستخدمة.
- قم بزيادة نسبة الماء المضاف إلى الرمال وكرر الخطوات مرة أخرى.

Observation and Conclusion:

- Water makes sand more slippery, which makes it easier for heavy blocks to move over it.

الملاحظة والاستنتاج:

- الماء يجعل الرمل أكثر انزلاقًا؛ مما يجعل انتقال الكتل الثقيلة عليه أكثر سهولة.



Glossary

Theme 1 – Unit 1 – Concept 1

Lesson (1)

English	Arabic	English	Arabic	English	Arabic
Analyze	يحلل	Scientist	عالِم	Growth	نمو
Soil	التربة	Liquid	سائل	Flower	زهرة
Stem	ساق النبات	Leaf	ورقة النبات	Roots	جذور النبات
Fruit	ثمرة	Absorb	تمتص	Kind	نوع
Healthy	صحي	Grow	تنمو	Leaves	أوراق الأشجار
Natural	طبيعي	Source	مصدر	Preparing	تحضير
Survive	يبقى على قيد الحياة – ينجو	Nutrients	العناصر الغذائية	Carbon dioxide	ثاني أكسيد الكربون
Shelter	مأوى	Photosynthesis	البناء الضوئي	Process	عملية
Similar	متشابه	Need	يحتاج	Air	هواء
Sugar	سكر	Produce	ينتج	Human	إنسان

Lesson (2)

English	Arabic	English	Arabic	English	Arabic
Experiment	تجربة	Test	اختبار	Germinate	تنبت
Seeds	بذور	Compare	قارن	Planted	مزروعة
Slower than	أبطأ من	Observation	الملاحظة	Essential	ضروري
Elements	عناصر	Light	ضوء	Dark	مظلم
Amount	كمية	Determine	يحدد	Important	مهم
Hydroponic system	نظام الزراعة المائية	Basic needs	احتياجات أساسية	Sunlight	ضوء الشمس
Beans seeds	بذور نبات الفول	Pale	شاحب		

Lesson (3)

English	Arabic	English	Arabic	English	Arabic
Xylems	أوعية الخشب	Tubes	أنابيب	Deliver	يوصل
Collect	يجمع	Through	خلال	Tiny	صغير الحجم
	المحور	Allow	يسمح	Impossible	غير ممكن
Specific	محدد	Function	وظيفة	Fix	يثبت
Increase	يزيد	Decrease	يقل	Transport	ينقل
Called	يسمى	Vessels	أوعية	Support	يدعم
Wood trunk	جذع خشبي	Upright stem	ساق مستقيمة	Climb stem	ساق متسلقة
Trunk	جذع	Shrubs	الشجيرات	Vines	العنب
Narrow	ضيق	Needle	إبرة	Pine	شجرة الصنوبر
Flat and wide	مسطحة وعريضة	Necessary	ضروري	Factors	عوامل
Product	ناتج	Mineral salts	أملاح معدنية	Occur	يحدث
Chlorophyll	كلوروفيل	Capture	يلتقط	Combine	اتحاد

Manufacture	صناعة	Starch	نشا	Fats	الدهون
Proteins	البروتينات	Live	يعيش	Phloem	أوعية اللحاء
Downward	لأسفل	Upward	لأعلى	Produce	ينتج
Stay alive	يبقى على قيد الحياة	Celery stalk	ساق الكرفس	Texture	نسيج

Lesson (4)

Compare	قارن	Digestive system	الجهاز الهضمي	Lung	الرئة
Circulating blood	الدورة الدموية	Circulatory system	الجهاز الدوري	Heart	قلب
Blood vessels	الأوعية الدموية	Cell	خلية	Organ	عضو
Muscles	عضلات	Bones	عظام	Veins	الأوردة
Arteries	الشرايين	Direction	اتجاه	Skin	جلد
Heal	الشفاء	Production	إنتاج	Considered	يعتبر
Environment	بيئة	Combine	يتحد	Transformation	تحول
Unidirectional tubes	أنابيب أحادية الاتجاه	Blood capillaries	شعيرات دموية	Receive	يستقبل
Specific	محدد	Structure	تركيب	Colorful	ملون
Chambers	غرف	Atrium	أُذَيْن	Two atria	أُذَيْنان
Ventricle	بُطَيْن				

Lesson (5)

Seed dispersal	انتشار البذور	Coconut	جوز الهند	Tomato seeds	بذور الطماطم
Plum seeds	بذور البرقوق	Apple seeds	بذور التفاح	Dandelion seeds	بذور الهندباء
Vital process	عملية حيوية	Depend on	يعتمد على	Function	وظيفة
Die	يموت				

Theme 1 – Unit 1 – Concept 2

Lesson (1)

Ecosystem	النظام البيئي	Include	تتضمن	Feed on	يتغذى على
Get	يحصل على	Escape	يهرب	Components	مكونات
Environment	البيئة	Consists of	يتكون من	Living organisms	كائنات حية
Nonliving things	عناصر غير حية	Interact with	يتفاعل مع	Human	بشر
Energy	طاقة	Flow through	تتدفق من خلال	Transfers	ينتقل
Search	يبحث	Danger	خطر	Imagine	تخيل
Hawk	صقر	Eagle	نسر	Depend on	يعتمد على
Indirect	غير مباشر	Attack	هجوم	Predators	الحيوانات المفترسة
Decomposers	الكائنات المحللة	Provide	يمد	Relationship	علاقة
Caracal	القط البري	Grass	العشب	Worms	الديدان
Main	رئيسي	Desert	صحراء	Rainforest	غابة استوائية
Ocean	محيط	Tundra	صحراء التندرا		

Lesson (2)

Breathe	يتنفس	Breathing	عملية التنفس	Thinking	التفكير
Doing activities	القيام بالأنشطة	Require	يتطلب	Primary	أساسي
Provides	يوفر	Convert	يحول	Able to	قادر على
Food chain	سلسلة غذائية	Classified	تتفرع إلى	Producers	الكائنات المنتجة
Consumers	الكائنات المستهلكة	Decomposers	الكائنات المحللة	Primary consumers	كائنات مستهلكة أولية
Secondary consumers	كائنات مستهلكة ثانوية	Tertiary consumers	كائنات مستهلكة درجة ثالثة	Alligators	تماسيح
Fungi	الفطريات	Bacteria	بكتيريا	Worms	الديدان
Millipedes	الديدان الألفية	Recycle	إعادة التدوير	Decomposition	تحلل
Rich in	غني بـ	Fertile soil	تربة خصبة	Observe	لاحظ
Food Chain	سلسلة غذائية	Relationships	العلاقات	Among	بين
Specific	محدد				

Lesson (3)

Grasshopper	الجراد	Food web	الشبكة الغذائية	Intersect	تتقاطع
Describe	يصف	Interconnected	متداخل	Several	العديد من

Lesson (4)

Researches	أبحاث	Ecology	علم البيئة	Restoration	ترميم
Wind	رياح	Habitats	بيئات	Seed dispersal	نثر البذور
Restoration ecology	الإصلاح البيئي	Natural areas (regions)	مناطق طبيعية	Plant community ecologist	عالمة نباتية
Sticky seeds	بذور لزجة	Light seeds	بذور خفيفة		

Theme 1 – Unit 1 – Concept 3

Lesson (1)

Protect	يحمي	Quality	جودة	Pollution	تلوث
Lake	بحيرة	River	نهر	Dry up	يجف
Climate	مناخ	Evaporate	يتبخر	Disappear	يختفي
Migrate	يهاجر	Resources	مصادر	Run out	ينفذ
Overfishing	الصيد الجائر	Marine	البحرية	Island	جزيرة
Sea star	نجم البحر	Conservation	الحفاظ على	Programs	البرامج
Separate	يفصل	Surrounded by	محاط بـ	Trigger fish	سمكة الزناد
Balance	توازن	Destroy	يدمر	Gentle rain	مطر خفيف
Heavy rain	مطر غزير	Lead to	تؤدي لـ / إلى	Floods	فيضانات
Drought	جفاف	Harm	يضر	Algae	الطحالب
Sea urchin	قنفذ البحر	Parrotfish	سمكة الببغاء	Clam	المحار
Coral reefs	الشعاب المرجانية	Zooplankton	العوالق البحرية	Coral	المرجان
Butterfly fish	سمكة الفراشة	Shark	القرش		

Lesson (2)

Mountain cliffs	المنحدرات الجبلية	Microorganisms	الكائنات الدقيقة	Dive	يغوص

Floating on	تطفو على	Surface	سطح	Area	منطقة
Suitable	مناسب	Assign roles	تقسيم الأدوار	Remove	إزالة
Recycled	يعاد تدويرها	Lake of food	نقص الغذاء		

Lesson (3)

Diverse	متنوع	Valuable	ذو قيمة	Tourism	السياحة
Coral bleaching	ابيضاض المرجان	Negative impact	التأثير السلبي	Ingest	ابتلاع
Around	حوالي	Microplastics	الجسيمات البلاستيكية	Garbage	قمامة
Toxic	سامة	Sharp	حاد	Jellyfish	قناديل البحر

Lesson (4)

Riverbanks erode	ضفاف الأنهار تتآكل	Wetlands	الأراضي الرطبة	Floods	فيضانات
Concerned citizens	المواطنون المهتمون	Restoration	استعادة	Nursery	المشتل
Diverse	متنوع	Single-use plastic	المواد البلاستيكية التي تستخدم مرة واحدة		

Theme 2 – Unit 2 – Concept 1

Lesson (1)

Matter	المادة	Everywhere	في كل مكان	Mass	كتلة
Occupies space	تشغل حيزًا من الفراغ	Exists	يتواجد	Shape	شكل
States of matter	حالات المادة	Solid	صُلب	Liquid	سائل
Gas	غاز	Water vapor	بخار الماء	Properties	الخصائص
Melts	ينصهر	Hardness	الصلابة		

Lesson (2)

Invisible	غير مرئي	Definite = fixed	ثابت (محدد)	Container	إناء
Considered	يعتبر	Energy	طاقة	Tiny identical particles	جسيمات صغيرة متطابقة
Continuous	مستمر	Motion	حركة	Melting	انصهار
Freezing	تجمد	Height	الطول	Meter stick	عصا مترية
Measuring tape	شريط قياس	Measure	يقيس	Scale	ميزان
Expands	يتمدد	Temperature	درجة الحرارة	Thermometer	ترمومتر
Misconception	مفهوم خاطئ	Germs	جراثيم	Exposed to	يتعرض لـ
Pour	يصب	Breathe	يتنفس	Blow	ينفخ
Microscope	ميكروسكوب	Indefinite	غير محدد	Together	معًا
Keep their shape	تحافظ على شكلها	Vibrate	تهتز	Spread out	ينتشر
Volume	حجم				

Theme 2 – Unit 2 – Concept 2

Lesson (1)

Dirt	أوساخ	Describe	يصف	Measure	يقيس
Roof	سَطح	Building	مبنى	Desert	صحراء

Mud	طين	Slide	ينزلق	Odor	رائحة
Sticks	العصي	Protect	يحمي	Dust	تراب
Temperature	درجة الحرارة	Tool	أداة	Thermometer	الترمومتر
Spring scale	الميزان الزنبركي	Volume	حجم	Measuring cup	وعاء القياس
Texture	ملمس				

Lesson (2)

Flour	دقيق	Spoon	ملعقة	Hand lens	عدسة اليد
Unknown	غير معروف				

Lesson (3)

Physical change	تغير فيزيائي	Chemical change	تغير كيميائي	Balance	ميزان
Magnet	مغناطيس	Density	الكثافة	Ash	رماد
Rust	صدأ	Mass	كتلة	Sink	يغوص
Float	يطفو				

Lesson (4)

Lighter than	أخف من	Poisonous	سامة	Flammable	قابل للاشتعال
Parachute	الباراشوت	Gloves	القفازات	Athletic shoes	أحذية رياضية
Divers	الغواصون	Conducts electricity	توصل الكهرباء	Electrical wires	أسلاك كهربائية
Cooking pots	أواني الطبخ	Transparent	شفاف	Light bulbs	المصابيح الكهربائية
Bridges	الكباري	Screwdrivers	المفكات	Hammer	شاكوش
Rubber	مطاط	Tires	الإطارات		

Theme 2 – Unit 2 – Concept 3

Lesson (1)

Fridge	ثلاجة	Exposed to	يتعرض لـ	Absorb	تمتص
Thermal energy	طاقة حرارية	Kinetic energy	الطاقة الحركية	Warming houses	تدفئة المنازل

Lesson (2)

Lose energy	يفقد الطاقة	Gain energy	يكتسب الطاقة	Freezing point	نقطة التجمد
Melting point	نقطة الانصهار	Melting	الانصهار	Freezing	التجمد
Evaporation	التبخر	Condensation	التكثيف		

Lesson (3)

Mixture	مخلوط	Compound	مركب	Combine	يتحد
Separate	يفصل	Salad	سلطة	Nuts	مكسرات
Filtration	عملية الترشيح	Cornstarch	نشا الذرة	Pepper	فلفل

Lesson (4)

Shaping	تشكيل	Flour	دقيق	Yeast	خميرة
Flaky	قشرة	Baking soda	بيكربونات الصوديوم	Digestion	عملية الهضم

Lesson (5)

Plenty of water	الكثير من الماء	Dehydrated	جفاف	Seaweed	الأعشاب البحرية
Shells	أصداف	Desalination	محطات تحلية الماء	Expensive	غالٍ

Unit 1 Concept 1

Plant Needs

P.O.C	Plants	Humans and Animals
Similarities	• All living organisms need water and air.	
Differences	They are different in: • Structure • Some needs • The way of getting food and gases	
Basic Needs (to survive)	• Air • Water • Sunlight • Nutrients	• Air • Water • Food • Shelter
Way of Getting Energy	Plants can make their own food (glucose) inside their leaves through the photosynthesis process.	They must move to get food because they can't make their own food.
Way of Getting Gases	Gases enter plants through the stomata in the leaves.	Air enters the human body through the mouth and nose, then travels to the lungs.

Some Concepts about Plant Needs:

Sunlight





① A plant has been placed in the sunlight.	② A plant has been placed in a dark room.
• It grows strong and healthy. • It grows with a tall stem. • It has more dark green leaves.	• It grows weak and unhealthy. • It grows with a short stem. • It has less pale green leaves.

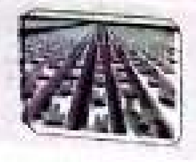
Soil



Soil isn't included as a basic need for plants because some plants may grow in water, or on another plant.

A plant can grow on a wet paper towel.

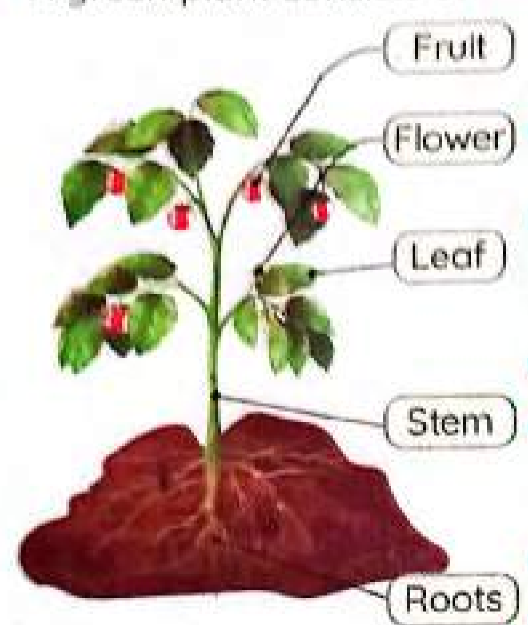
- The initial growth of the seeds in the wet paper towel and soil is similar.
- The seeds planted in wet paper towels grow slower than those planted in soil.



Hydroponic system:
It is a system full of water that contains important minerals and elements for plants to grow.

Plant Structure

- All structures inside the plant help it survive and grow.
- A green plant consists of roots, stem, leaves, and sometimes fruits and flowers.



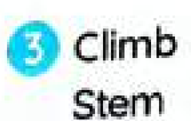
- Helps the plant reproduce by producing seeds.
- Making the plant's food (glucose) through photosynthesis.
- Supports the plant parts.
- Carries water and nutrients from the roots to the leaves through the xylem.
- Absorb water and nutrients from the soil.
- Fix the plant in the soil.

Other small structures inside the plant:

Root hairs (extend from the roots)	• They increase the amount of water and nutrients absorbed from the soil.
Xylems	• They are smaller vessels that transfer water and nutrients from the roots to the leaves.
Phloems	• They transfer food from the plant's leaves to other plant parts.
Chlorophylls (inside the leaf)	• They capture the light energy from the Sun. • They are responsible for the green color of the leaves.
Stomata (inside the leaf)	• They are pores on the plant leaf that allow air to move in or out.



Types of Stems

① Wood Stem	② Upright Stem	③ Climb Stem	④ Tubers Stem	⑤ Runners Stem
				
				
Tree trunks and shrubs	Most flowers	Vine (grapes)	(Extend underground) Potato plants	Extend above and along the ground and help to form new plants.



Types of Leaves

① Narrow Leaves (Look like needles) (as pine trees)	② Flat and Wide Leaves
	

Flowers

- Flowers are reproductive parts of a plant as they help the plant to reproduce by producing seeds.
- Flowers on plants have different shapes, sizes, and colors.
- Some plants have very small flowers that are hardly noticeable, such as grass.
- Sunflowers have small, dark-colored seeds in the center of the flower.

Ways of Seed Dispersal

Seed dispersal • It is the transferring of seeds from one place to another.

• The way of seed dispersal depends on the shape and size of the seeds.

1 Floating on water surface



2 Traveling by wind (light and feathery)



Coconut Seeds



Maple Seeds



Dandelion Seeds

3 Sticking on animals' fur or on human clothing

4 Eaten by animals and come out with their stool



Plum Seeds (rough seeds, have spine)



Tomato Seeds



Apple Seeds

Photosynthesis

It is the process in which the plant uses the light of the Sun to make its own food inside the plant leaves.







Steps:

1. Plant's roots absorb water and nutrients from the soil.
2. The xylem transports water and nutrients from the roots to the leaves.
3. The chlorophyll captures the light energy from the Sun.
4. The stomata allow air to enter the plant's leaf.
5. In the presence of sunlight, water combines with carbon dioxide gas to make sugar called glucose.
6. The phloem moves the glucose from the leaves to other parts of the plant.
7. The plant releases oxygen and water in the air.

Energy Transformation:

• Light energy absorbed from sunlight is converted into chemical energy.

Products of Photosynthesis:

1 Glucose as a source of energy for plants.
2 Plants release oxygen gas and water into the air.
(Oxygen gas is considered one of the basic needs for humans and animals)




Light energy + Carbon dioxide gas + Water and mineral salts —Photosynthesis→ Glucose + Oxygen gas & Water vapor

Comparing Plants and Humans Systems

P.O.C	Human Circulatory System	Plants Transport System
Drawing	 	Water and minerals Food
Structure	• It consists of the heart and blood vessels (arteries, veins and blood capillaries). • Arteries: They carry blood rich with oxygen and glucose from the heart to the organs, muscles, bones, and cells so that the body can grow and heal. • Veins: They return the blood that carries carbon dioxide and is low in nutrients and oxygen to the heart for a recharge.	• Xylem: Transports water and nutrients from the roots to the plant's leaves. • Phloem: A set of tubes that transports the food materials from the leaves to other parts of the plant.
Similarities	1 They are similar in function, which is transporting nutrients and gases to all parts of the living organism. 2 Both have one-way vessels.	

Unit 1 Concept 2

Energy Flow in Ecosystems

Ecosystem: It's a community that contains living organisms that interact with nonliving things.

Ecosystem Components

Living Organisms	Biotic Factor	• Humans	• Animals	• Plants
Nonliving Things	Abiotic Factor	• Air	• Soil	• Water

Ecosystem examples:

Forest | Desert | Sea | Tundra

- Ecosystems provide living organisms with food and shelter to survive.
- Energy moves between animals when they feed on each other.
- When living organisms die, their bodies decompose.
- Animals don't choose their food, but they eat what their bodies need.

Caracals eat mice.	Rabbits eat grass.	Birds eat butterflies and worms.



- Hawks are meat-eating animals
- Hawks eat snakes, mice, fish, birds, squirrels, rabbits, and other small ground animals
- Hawks don't eat plants, but they eat animals that eat plants. So, they also depend on plants.
- Hawks are attacked by a few predators, such as eagles and other hawks
- When hawks die, decomposers return their energy to the soil.

Energy Transfer in Ecosystems

- The Sun is the primary (main) source of energy for all living organisms.

1 Producers: (The first link in any food chain)

- They are living organisms that can make their own food in the presence of sunlight.
- Examples: Green plants - Algae

2 Consumers:

- They are living organisms that feed on other organisms to get energy.

a. Primary consumers: (The second link in a food chain)
They are living organisms that eat producers, such as insects.

b. Secondary consumers:
They are living organisms that eat primary consumers, such as birds.

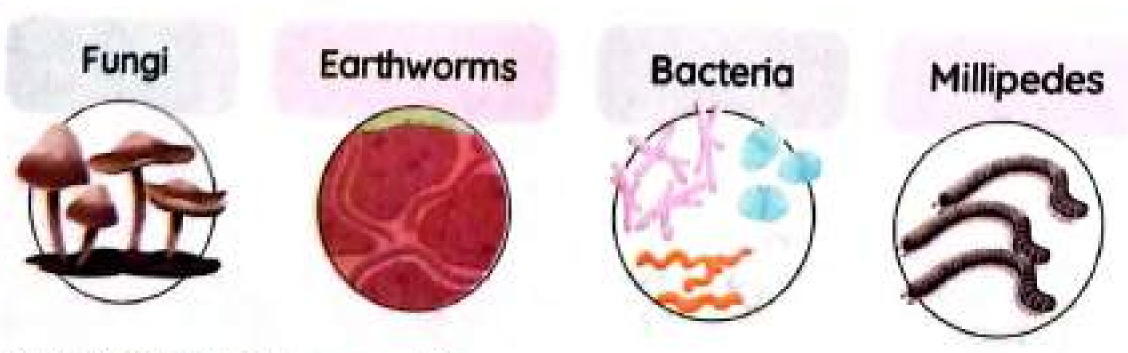
c. Tertiary consumers: (The third link in a food chain)
They are living organisms that eat secondary consumers, such as alligators.

3 Decomposers: (The final link in any food chain)

- They are living organisms that carry out the decomposition process by decaying dead organisms.
- Importance:

a. Recycling nutrients back into the ecosystem.

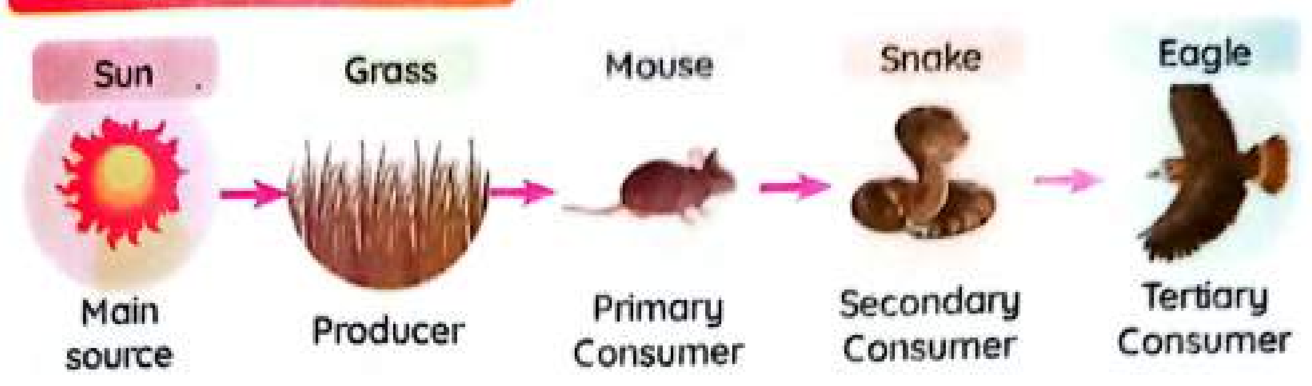
b. Increasing the soil's fertility.



- Green plants are producers, while animals and humans are consumers.

Food chain • It is a model that shows a linear set of feeding relationships and the movement of energy among living organisms.

Example of a food chain:

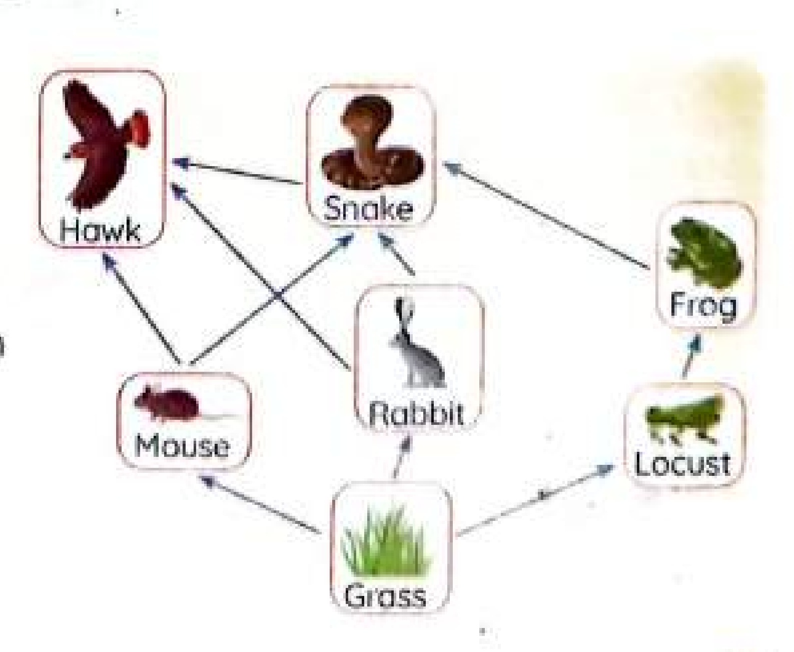


- The energy from the Sun passes to the grass, then to the mouse, then to the snake, then to the eagle.



Food web • It is a model that shows many different feeding relationships among living organisms.

- A food web is made up of several interconnected food chains.
- The food web is better than the food chain in showing the interaction among organisms.



Dr Becky Barak

- She is a plant-community ecologist
- She gets to do her research out on the natural areas (not inside a lab).
- She learned about ecology, and took a class in restoration ecology.



Seed dispersal

1 Sticky Seeds	2 Light (Flying) Seeds
Their seeds can stick to Human clothing / Animal fur  	They are dispersed by the wind. How? • The seeds are released from the plant when the plant is ready. • The seeds fly away to new habitats to grow in other places.



Unit 1 Concept 3

Changes in Food Webs

The energy in an ecosystem remains as it is.

- Some of the energy transfer among living organisms when they feed on each other.
- Most of the energy are recycled back to the ecosystem by decomposers.

In any ecosystem:

If producers disappear,	• Primary consumers will die quickly. • Secondary consumers will migrate or die.
If the number of one species of organisms increases too much,	• The food resources will run out.
If there are many top predators in the food web,	• The number of other consumers will decrease.

In the desert ecosystem:

Gentle Rain	• Rainwater helps producers grow. • Consumers will feed on producers.	• The desert ecosystem might be improved.
Heavy Rain	• Heavy rain leads to floods, which destroy the ecosystem.	• The desert ecosystem might be harmed.
Drought	• Producers will die. • Consumers will migrate or die.	• The desert ecosystem might collapse.

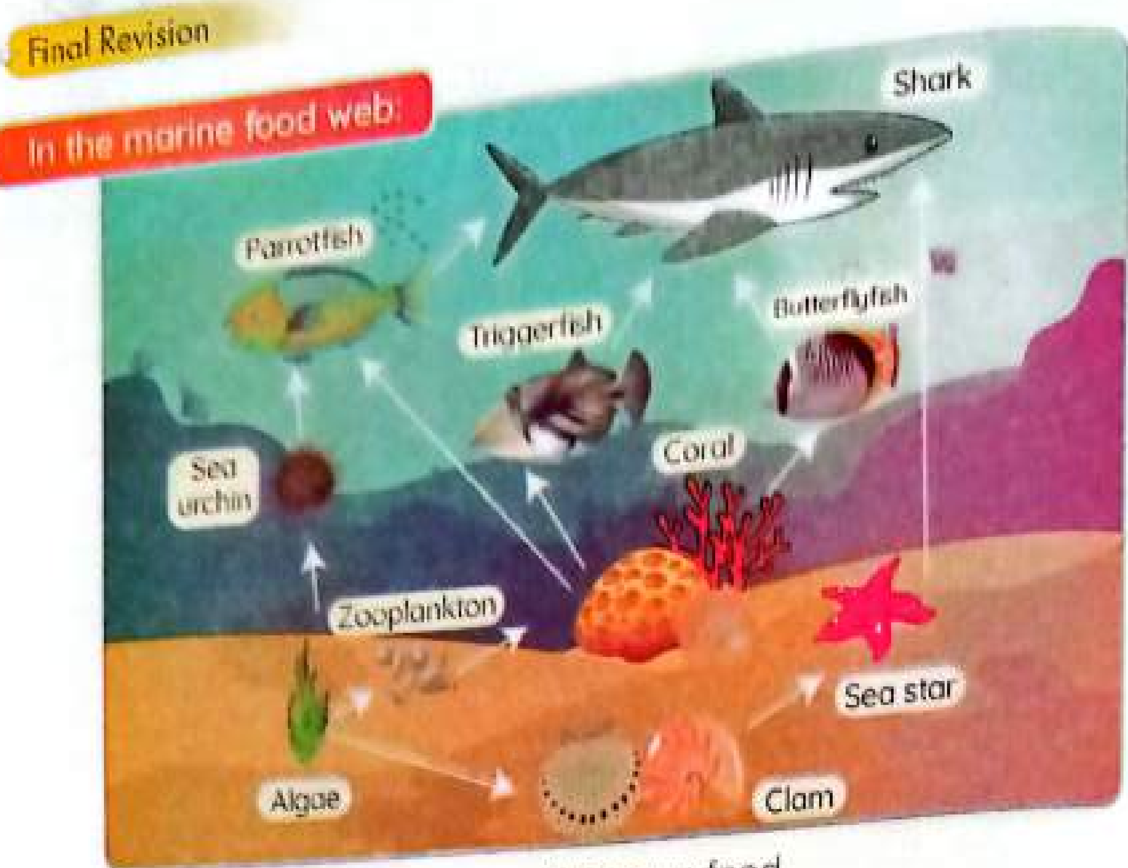
In the marine ecosystem:

Overfishing	• A human activity that leads to a decrease in the number of fish.
Water Pollution	• A human activity in which humans throw waste materials in the water. • Pollution: It's the harm that happens to air, water, or soil by substances that harm living organisms.

How can Palau Island protect the marine environment?

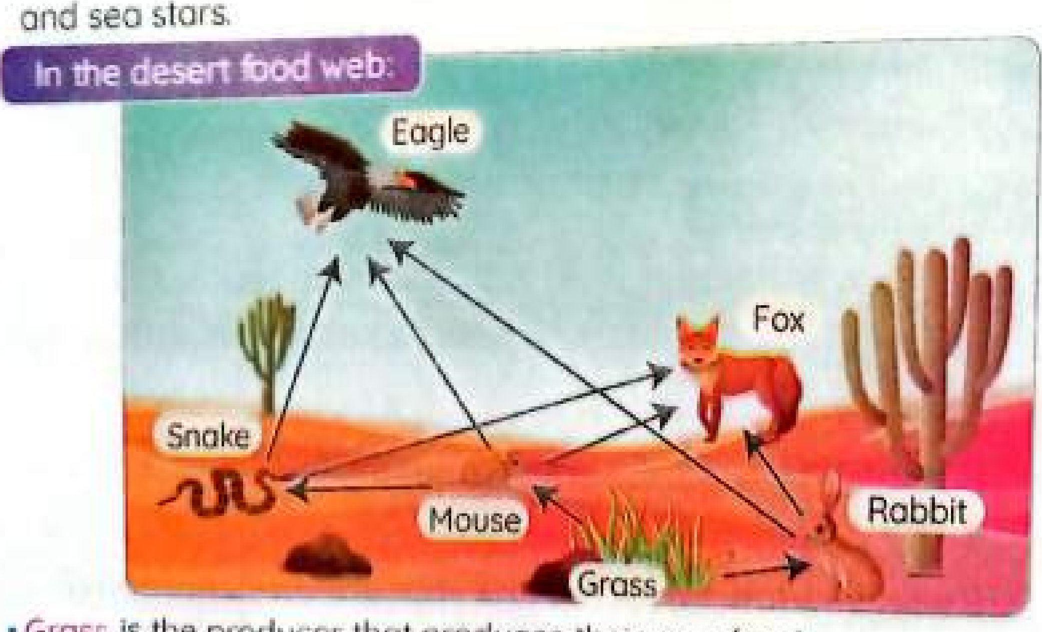
1. Palau manages land activities to control the quality of the marine environment.
2. Palau prevents fishers from overfishing in coral reef regions.

In the marine food web:



- Algae are producers that produce their own food.
- Zooplankton, clams, and sea urchins are primary consumers.
- The sea star feeds on the clam and is eaten by sharks.
- The parrotfish feeds on sea urchins or corals.
- Butterflyfish and triggerfish feed on corals.
- The shark is a top predator that eats butterflyfish, parrotfish, triggerfish and sea stars.

In the desert food web:



- Grass is the producer that produces their own food.
- Rabbits and mice are primary consumers that feed on producers.
- Hawks and foxes are top predators.

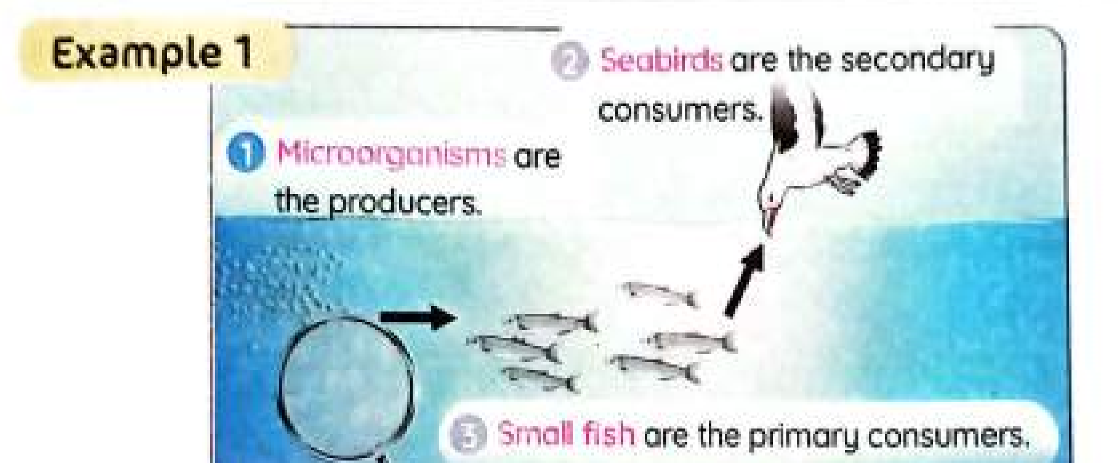
Effect of Climate on Population

The climate changes affect the population of a species, as follows:

1. If they were suitable, the population of species would increase.
2. If they were unsuitable, the population of species would decrease because organisms may die or migrate.

Population	It is the number of organisms of one type of species in an area.
Population change	It is the increase or decrease in the number of one species in any area.

Example 1



1 Microorganisms:

- Microorganisms are the producers because they can make their own food.
- They are found in cold water habitats because they need cold water to survive.

2 Small fish:

- Small fish are primary consumers that feed on microorganisms floating on the water surface.

3 Seabirds:

- Seabirds build their nests on the top of mountain cliffs.
- Seabirds dive down the sea to feed on the small fish.

What will happen if water becomes warm?

Microorganisms	Small fish	Seabirds
will move towards cooler areas.	will also move to new habitats.	will have no food, so some may find new habitats, while the others may die.



Example 2

- Coral reefs are from the most diverse and valuable ecosystems on Earth.
- Importance of coral reefs:
  1. Coral reefs provide food and shelter for many marine organisms.
  2. Coral reefs are also important for tourism.

How does coral bleaching happen?

When the water becomes too warm:

1. Corals reefs will get rid of the algae living in their tissues.
2. This causes the color of the coral reefs to turn completely white.
3. Bleaching events stress corals, so they do not survive.

Effect of Plastic Pollution

- Plastic is very dangerous because it is not nutritious and could be sharp or toxic.
- Some marine organisms cannot know the difference between real food and plastic, such as whales, turtles, seabirds, and fish.

Examples

Turtles

Turtles eat a lot of plastics, thinking that they are jellyfish.

Corals

Corals filter the seawater to get their food, so they ingest microplastics.

- **Microplastics:**

  They are small plastic pieces that are even smaller than a grain of rice.

- **How they are formed:**

  Plastic products get broken down into smaller pieces by the effect of the Sun.

Habitat restoration • It is the process of returning a habitat to its natural state before harm was done.

Example:

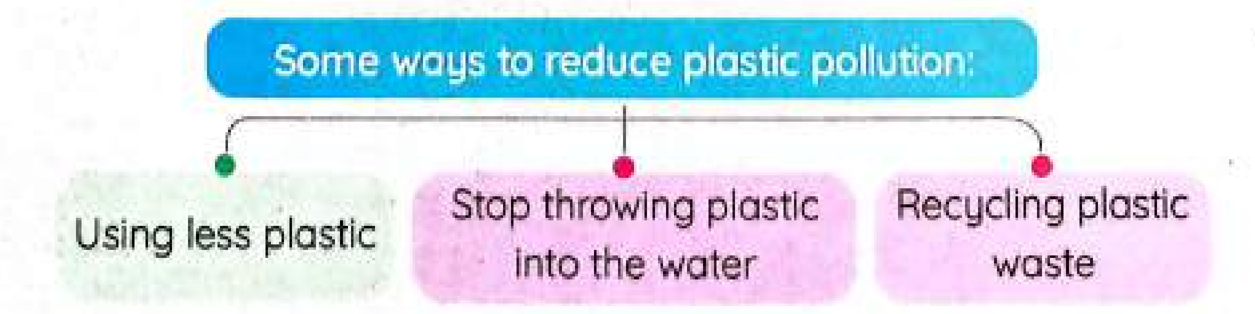
Coral reefs rehabilitation project in Arabian Gulf

1. Scientists harvest small parts of coral species.
2. Scientists move these small parts to a nursery.
3. Healthy coral reefs can then grow and reproduce.
4. They're moved back to the reefs where they were dying.

Nursery • It is an area in the ocean where scientists take care of small pieces of corals until they grow and are moved back to the reefs where they were dying.



Zero plastics • A way adopted by coastal communities in Egypt to decrease plastic pollution by limiting single-use plastic on land.



Unit 2 Concept 1

Matter in the World Around Us

Matter

- Matter is anything that has mass and volume (takes up space).
- Matter can exist in three states: solid, liquid, and gas.
- All matter is made up of tiny, identical moving particles.
- Light, sound, and heat are not matter, but they are forms of energy.

Measuring Tools

Tape Measure	Spring Scale	Measuring Cup
It is used to measure length.	It is used to measure weight.	It is used to measure volume.

Thermometer	Electron Microscope
It is used to measure temperature.	It is used to see individual particles.

States of Matter

P.O.C	Solids	Liquids	Gases
Shape	• Definite (fixed) • Keep their shape.	• Indefinite shape • Take the shape of the container • Can be poured	• Indefinite shape • Fill their container and take its shape.
Volume	• Definite (fixed)	• Definite (fixed)	• Indefinite
Spaces between particles	• Very close • Are held together (packed tightly)	• Have more space • Are held together more loosely	• Have a lot of space • Are not held together
Energy of particles	• Less energy	• More energy	• A lot of energy
Motion of particles	• Move only a little bit (move around their place) (vibrate)	• Move more freely. • Move faster than solids. • Can slide over each other.	• Move very freely. • Move very quickly.
Arrangement of particles	• Regular (organized) • Packed in a neat, ordered arrangement.	• Are not well organized.	• Have random arrangements. • Are not well organized at all.

Model • It is a copy that is similar to the real thing.

Importance of models:

1. Models are a great way to see many things at the right size (not the real size).

Models represent very big things in a smaller size, such as:	Models represent very tiny things in a bigger size, such as:
Globe model • It is a model of Earth (whole world).	**Germs model** • To see the shapes of germs.
Solar system model • To compare planets.	• To see different parts that help germs spread from a person to another.



2. Models can help us understand how things work.

Volcano model • It is a model of a volcano that shows how ooze liquid comes out during an eruption.

Unit 2 Concept 2

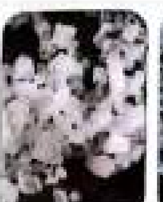
Describing and Measuring Matter

Properties of Matter

- Salt, sugar, and flour have the same color.
- They have different textures, odors, and shapes.

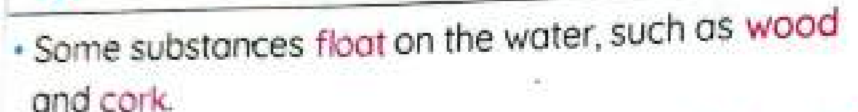
  ⓐ Sugar has large crystals. ⓑ Salt has small crystals.

  ⓒ Flour has fine particles

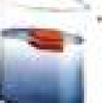



Salt

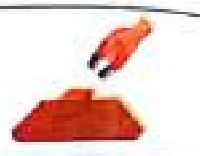
Sugar


- Some substances float on the water, such as wood and cork.


- Some substances sink in the water, such as iron and stone.


- A magnet can attract some metals, such as iron.



- Temperature measures how quickly the particles in a substance are moving.
- Quick-moving particles produce more heat energy than slow-moving particles.

Volume and Mass

Volume	Mass
It is the amount of space that the matter takes up.	It is the amount of matter.
Measuring Device	
Measuring cup	Balance (Scale)
Measuring units	
Liters - milliliters - cubic centimeters (cm^3) (1 L = 1,000 mL = 1,000 cm^3)	Grams - kilograms (1 kg = 1,000 g)
Example	
A big bottle of water contains 1 liter or more. 	A paperclip has a mass of about 1 gram. 

- Changing the shape of a material doesn't affect its mass.





- Changing the size of a material affects its mass.





Roofs

- Roofs are different according to the climate.

	Desert Home	Cold-Weather Home	Rainforest Home
Figure			
Shape	Flat	Slanted (inclined)	Slanted (inclined)
Material	Strong stones	Ceramic tiles (bricks)	Leaves and sticks
To Protect It From	Dust and dirt	Rain and snow	Animals

Uses of Different Matter

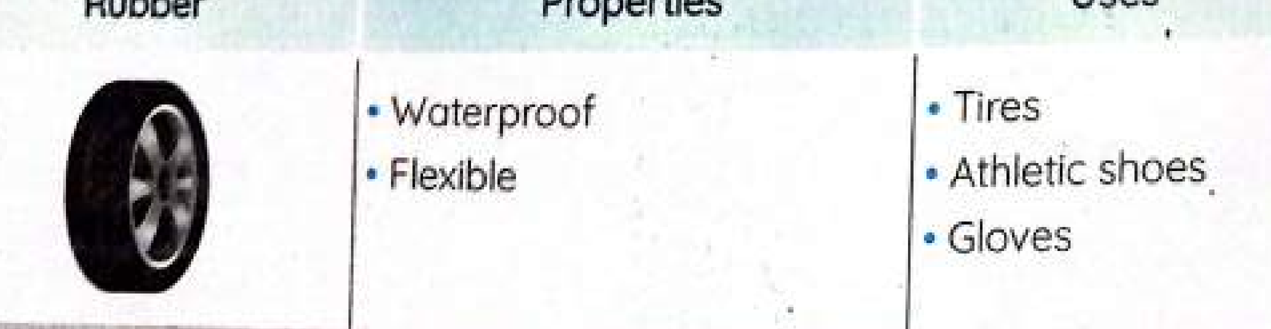
Helium	Properties	Uses
	• Lighter than air • Not poisonous • Not flammable	• To fill balloons • To fill blimps

Copper	Properties	uses
	• Flexible (can be stretched) • Conducts electricity well. • Transfers heat well.	• Electrical wires • Cooking pots

Glass	Properties	Uses
	• Transparent • Smooth	• Eyeglasses • Windows

Steel	Properties	Uses
	• Hard • Strong	• Screwdrivers • Hammers

Rubber	Properties	Uses
	• Waterproof • Flexible	• Tires • Athletic shoes • Gloves



Unit 2 Concept 3

Comparing Changes in Matter



- Melting is the opposite (reverse) process of freezing.

Melting	Freezing	Evaporation	Condensation
			
Changing matter from a solid state to a liquid state by heating.	Changing matter from a liquid state to a solid state by cooling.	Changing matter from a liquid state to a gaseous state by heating.	Changing matter from a gaseous state to a liquid state by cooling.

- Evaporation is the opposite (reverse) process of condensation.
- Melting happens when the temperature of the ice rises above 0°C.
- Freezing happens when water is cooled below 0°C.
- 0°C is the melting point of water.
- 100°C is the boiling point of water.

Changing temperature




- Temperature is a measurement of how quickly the particles in a substance are moving.
  - When the temperature increases, particles move faster and get far from each other.
  - When the temperature decreases, particles move slower and get closer to each other.
- Changing the temperature affects the state of the matter, but it doesn't affect its mass.



Heat (Thermal Energy)



- It is a form of energy you use every day for warming houses, cooking food, ... etc.

When the particles of matter absorb light or thermal energy:



The speed of the particles increases. ► The kinetic energy increases. ► Matter becomes warmer.

Physical Change - Chemical Change

P.O.C	Physical Change	Chemical Change
Properties	• It is a change in the shape, size, or state of matter without changing its structure. (No new substance is formed)	• It is a change in the structure of matter. (New substance with new properties is formed)
	• Matter can be reversed.	• Matter can't be reversed.
Examples	• Melting of (wax - ice) • Freezing • Evaporation • Condensation • Cutting of (paper - fruit - cloth) • Grinding sugar into powder • Bending (shaping) matter	• Burning of (paper - wood) • Iron rust • Making bread • Adding vinegar to baking soda • Digestion of food • Rotting fruits • Vinegar + baking soda → gas bubbles • Iodine + starch → blue substance

Mixtures and Compounds

- A mixture is different from a compound.
- The mass of each mixture equals the total mass of its components.

Mixture	Compound
A mixture is a matter made up of two or more substances that don't combine chemically.	A compound is a matter made up of two or more substances that combine chemically.
Examples	
• Salad • Air • Salt water	• Carbon dioxide gas • Water

A mixture may consist of

Solid Substances	Solid and Liquid Substances	Gaseous Substances
		
1 Mixture of nuts 2 Mixture of sand and rocks 3 Salad	1 Mixture of salt and water 2 Mixture of sugar and water	• Atmosphere (air)

Separation of Mixtures

Evaporation	Filtration
	
It's used to separate: solid materials that are **soluble** in water.	It's used to separate: solid materials that are **insoluble** in water.
Example	
Separation of soluble salt in water	Separation of insoluble sand from water

Desalination • It is the process of removing salts from seawater.

First step: Filtration of Seawater	Second step: Boiling of Seawater
	
• Filtration of seawater to separate large materials, such as pieces of seaweed, shells, and fish.	• Boiling seawater, then condensing it to separate salts and minerals.

Disadvantages of desalination:

1. It is very expensive.
2. It needs a lot of energy.
3. It has bad effects on the marine organisms.

2 Definitions



Unit 1 Concept 1

Photosynthesis process	It is the process through which plants use the energy of the Sun to make their own food.
Stomata	They are pores on the plant's leaves that allow gases to move in and out of the plant.
Glucose	It's the sugar that is produced during the photosynthesis process and it provides energy for the plant to survive and grow.
Plant reproduction	It is the process of making new plants.
Circulatory system	It is the system that transports blood and other fluids throughout the body.
Arteries	They're blood vessels which carry blood that is rich in oxygen and nutrients (glucose) from the heart to the body cells, so that the body can grow.
Veins	They're blood vessels that carry the blood containing carbon dioxide gas and that is low in nutrients and oxygen from all body parts back into the heart.
Xylems	They're tubes that carry water and nutrients from the roots to the leaves.
Phloems	They're tubes that carry sugar from the leaves to all plant parts.
Flowers	They are the reproductive parts of the plant.
Seed dispersal	It's the transfer of seeds from a place to another.

Unit 1 Concept 2

Ecosystem	It's a community that contains living organisms and nonliving things that interact with each other.
Producers	They are organisms that can make their own food.
Consumers	They are organisms that eat other living organisms to get their energy because they cannot make their own food.
Primary consumers	They are animals that eat producers.
Secondary consumers	They are animals that eat primary consumers.
Tertiary consumers	They are animals that eat secondary consumers.
Decomposers	They are organisms that carry out the process of decomposition by decaying dead organisms.
Prey	They are animals hunted (eaten) by other animals.
Predators	They are animals that hunt (eat) other animals.
Food chain	It is a model that shows one linear set of feeding relationships and the movement of energy between living organisms.
Food web	It is a model that shows many different feeding relationships among living organisms.

Unit 1 Concept 3

Pollution	It's the harms that happen to air, water, or soil by substances that harm living organisms.
Population	It is the number of organisms of one type of species living in an area.

Population change	It is the increase or decrease in the number of one species in an area.
Top predators	They are consumers that exist at the top of food chains
Microorganisms	They are producers in the marine food web.
Coral reefs	They are the most diverse and valuable ecosystems on Earth.
Coral bleaching	It happens when the temperature of water rises, and the color of coral reefs turns to white.
Microplastics	They're small pieces of plastic (smaller than a grain of rice) that are formed due to the effect of the Sun.
Habitat restoration	It is the process of returning a habitat to its natural state before any harm was done.
Nursery	It's an area in the ocean, where scientists take care of small pieces of corals until they grow up and can be moved back to the reefs where they were dying.
Zero plastics	It is a new way of life adopted in Egypt, in coastal communication near coral reefs by limiting single-use plastic on land.

Unit 2 Concept 1

Matter	It is anything that has mass and takes up space.
Solid	It is a state of matter that has a definite volume and shape.
Liquid	It is a state of matter that has a definite volume, but it doesn't have a definite shape.
Gas	It is a state of matter that has no definite volume or shape.

Model	It is a copy that is similar to the real thing.
Globe	It is a model that shows us the shape of Earth.
Solar system model	It is a model that helps us see all planets and compare between them.
Volcano model	It is a model that shows us the shape of a volcano.

Unit 2 Concept 2

Measuring cup	It's a tool that is used to measure the volume of matter.
Measuring tape	It's a tool that is used to measure the length of matter.
Balance (Scale)	It's a tool that is used to measure the mass of matter.
Thermometer	It's a tool that is used to measure the temperature of matter.
Volume	It is the space that the matter takes up.
Mass	It is the amount of matter.
Temperature	It is a measurement of how quickly the particles in a matter are moving.
Helium	It is a light, non-poisonous, non-flammable gas that is used to fill balloons and blimps.
Copper	It's a material that is used in making electric wires and cooking pans.
Conduction	It's the ability of the material to transfer heat and conduct electricity.

Steel	It's a hard and strong material that is used to make screwdrivers and hammers.
Glass	It's a transparent material that is used to make windows and eyeglasses.
Rubber	It's a flexible material that is used to make tires and gloves.

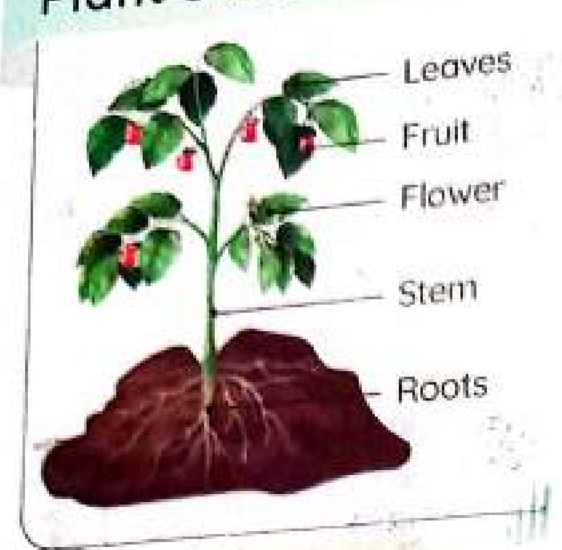


Physical change	It is a change that happens to the matter without changing its structure.
Chemical change	It's a change in the structure of matter, to produce new matter with different properties.
Melting	It is a process in which matter is changed from a solid state into a liquid state (by heating).
Freezing	It is a process in which matter is changed from a liquid state into a solid state (by cooling).
Evaporation	It is a process in which matter is changed from a liquid state into a gaseous state (by heating).
Condensation	It is a process in which matter is changed from a gaseous state into a liquid state (by cooling).
Mixture	It is a form of matter formed of two or more substances that don't combine chemically.
Compound	It is a form of matter, made of two or more substances that combine chemically.
Desalination	It is the process of removing salts from seawater.

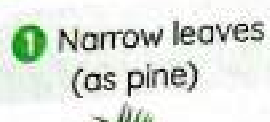
3 Important Drawings



Plant Structure



Types of Leaves





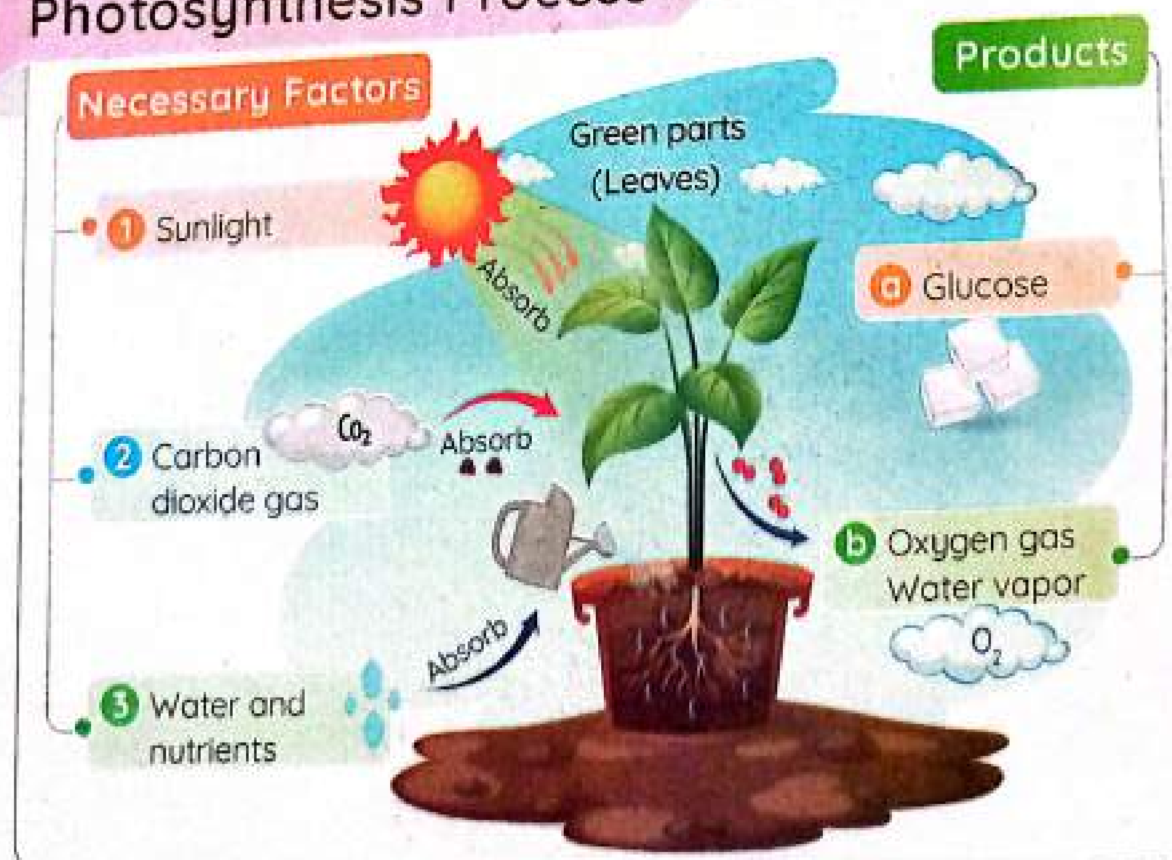




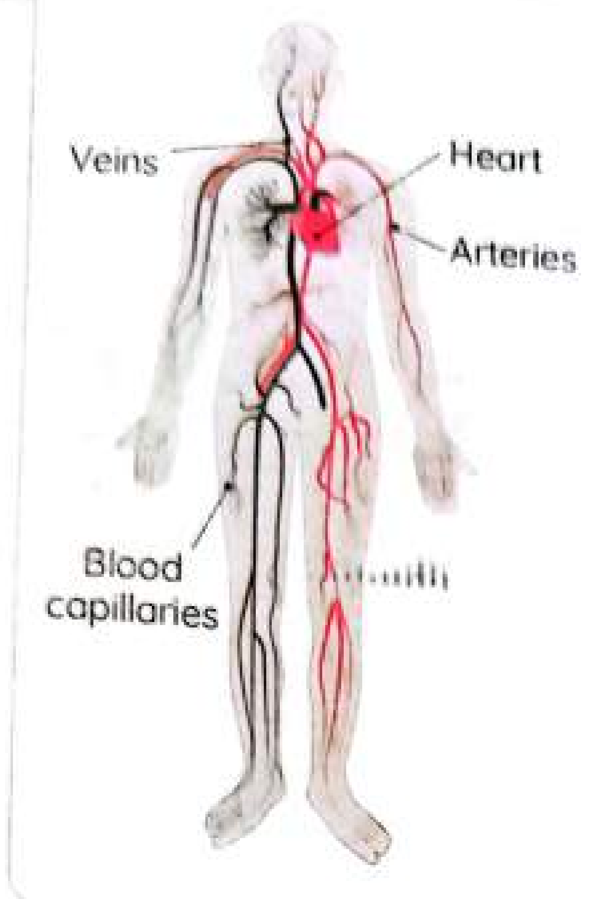
Types of Stems



Photosynthesis Process



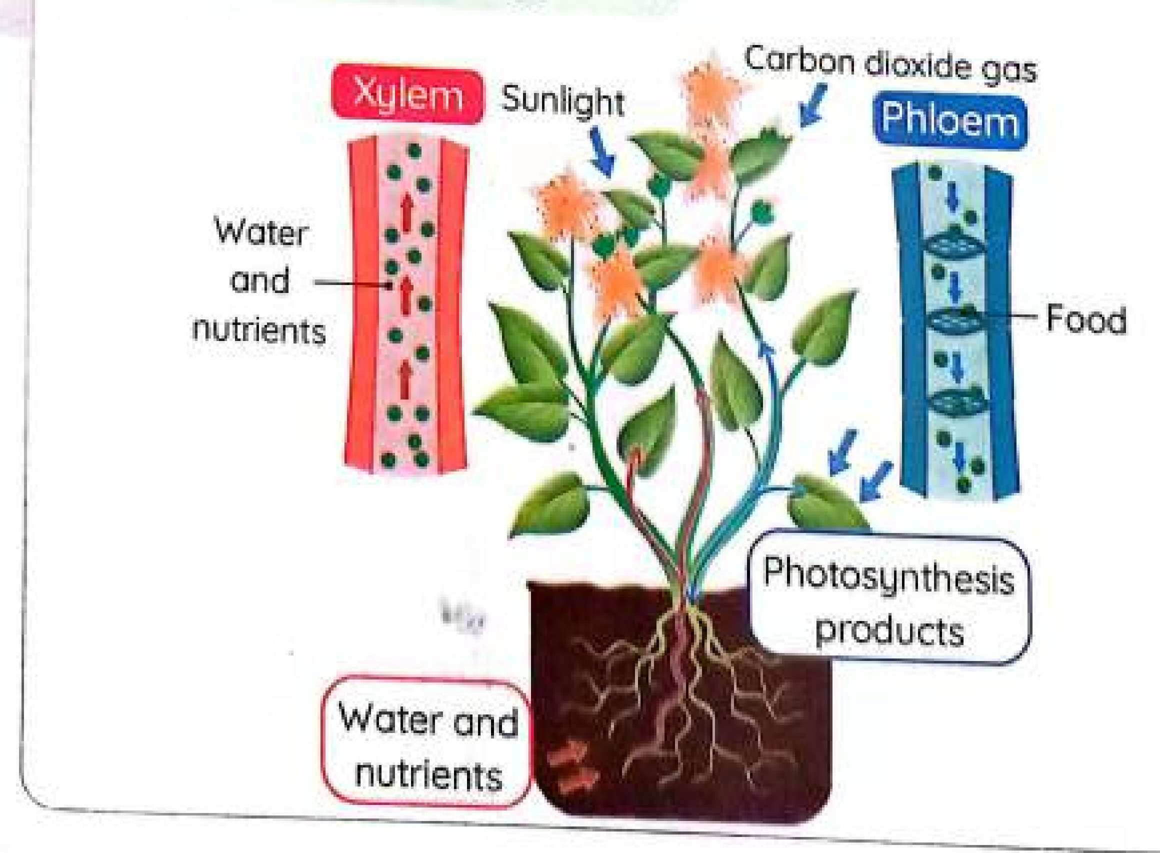
Human Circulatory System



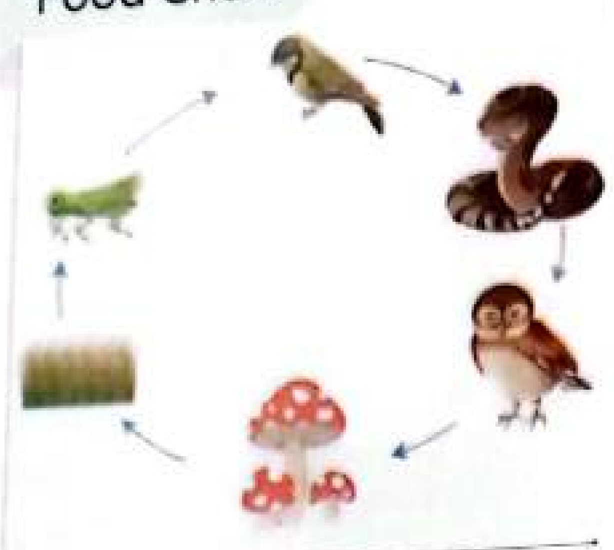
Ways of Seed Dispersal



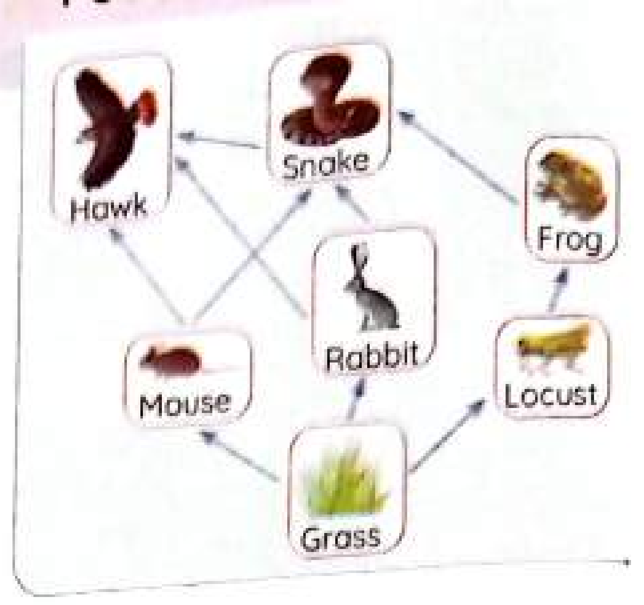
Plants Transport System



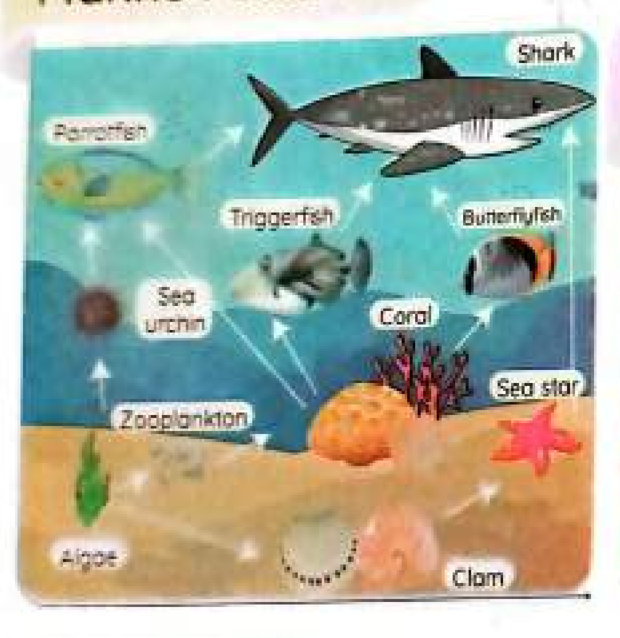
Food Chain



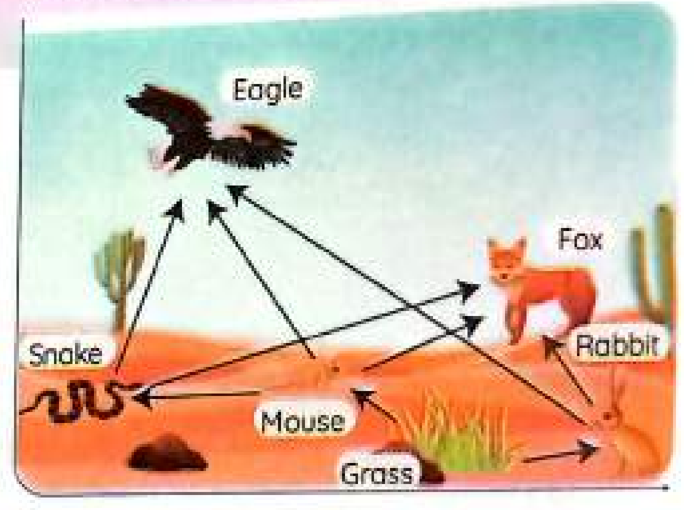
Food Web



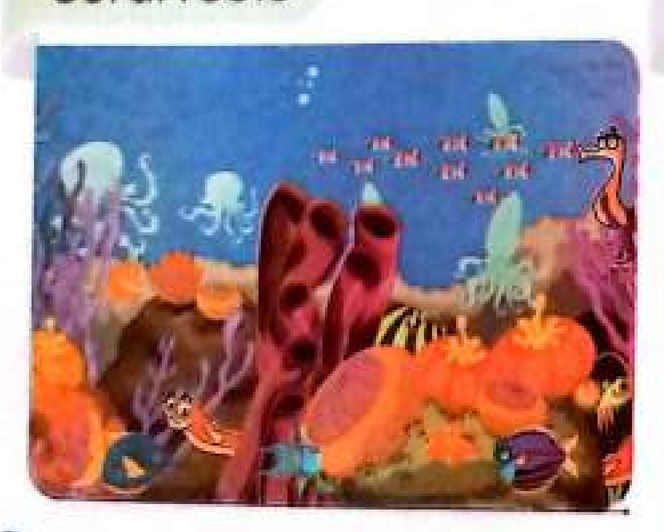
Marine Food Web



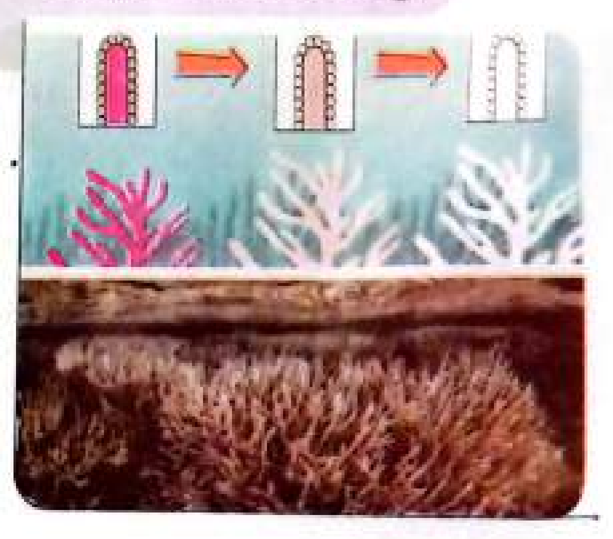
Desert Food Web



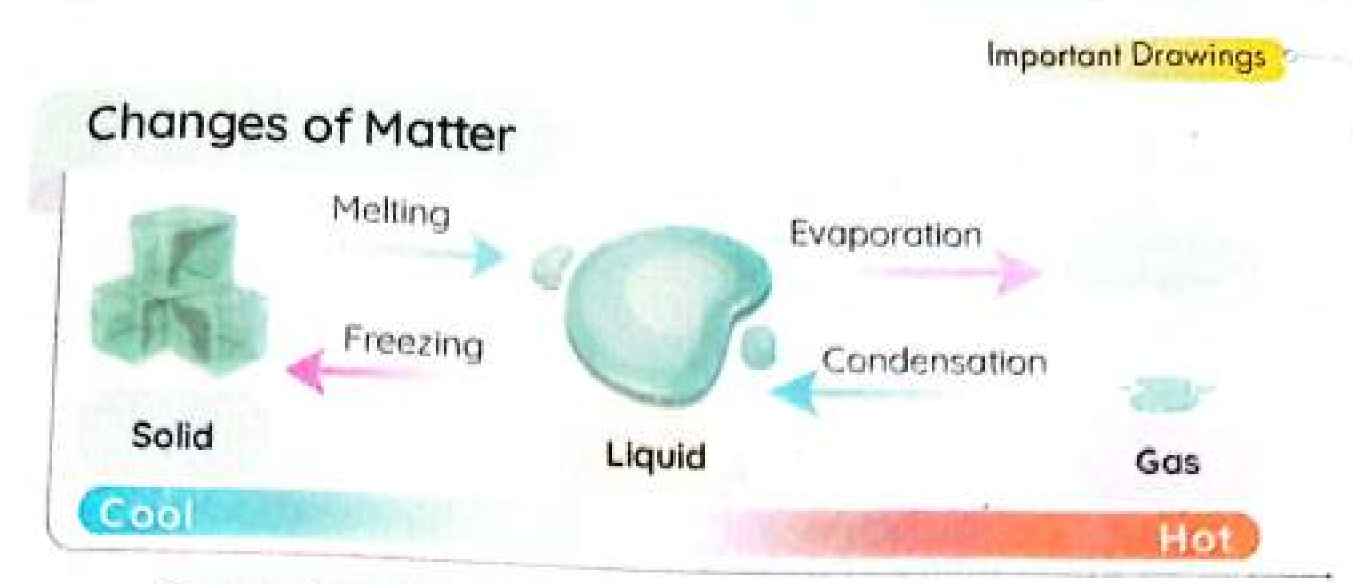
Coral reefs



Coral Bleaching



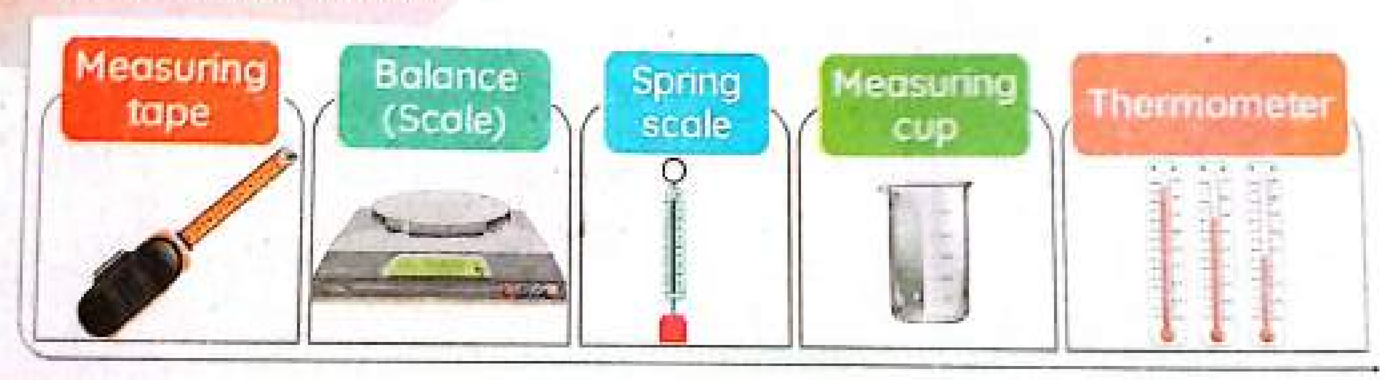
Changes of Matter



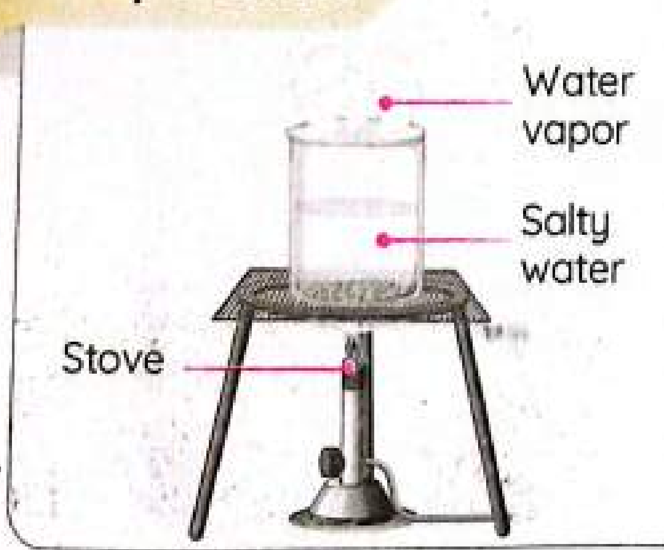
Particles Spaces



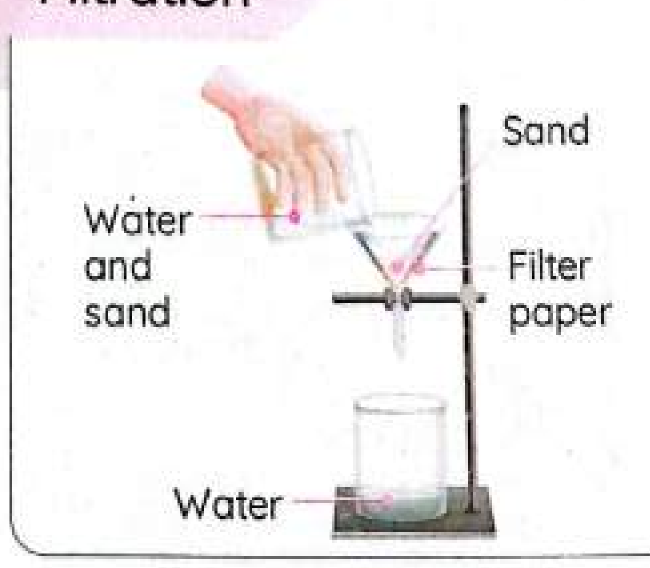
Measuring Tools



Evaporation



Filtration



4 Give Reasons For...



1. Plants' roots have great functions.
   - Plant's roots absorb water and nutrients from the soil.
   - Plant's roots fix the plant in the soil.
2. Sunlight is considered a basic plant need.
   - Because the plant uses the light energy of the Sun to make its own food through photosynthesis process.
3. Plants are important for human life.
   - Because green plants produce oxygen gas during photosynthesis process.
4. Living organisms are different in the way of getting food.
   - Because plants can make their own food in their leaves through photosynthesis, while animals and humans must eat food to get energy.
5. Soil isn't considered a basic need for plants.
   - Because some plants don't need soil to grow and they may grow in water, or on another plant.
6. Roots' hairs help the plant to survive and grow.
   - Because roots' hairs increase the amount of absorbed water and nutrients from the soil.
7. The stem has great functions for plants.
   - It transports water and nutrients to the leaves through the xylem.
   - It supports the plant parts.
8. Leaves are very important for the plant to survive.
   - Because the leaves are responsible for making the plant's food through photosynthesis process.
9. Stomata have a great importance for the plant.
   - Because stomata allow air to go in or out the plant's leaf.
10. Chlorophyll has a great function for the plant.
    - Because chlorophyll captures (absorbs) the light energy from the Sun.
11. Xylem is very important for plants.
    - Because xylem transfers water and nutrients from the roots to the leaves.
12. Phloem is very important for plants.
    - Because phloem transfers glucose from the leaves to other plant parts.

13 Photosynthesis process is very important for all living organisms.

For plants:

- Photosynthesis process helps the plants to make their own food (glucose).

For animals and humans:

- Photosynthesis process produces oxygen gas that is considered a basic need for them.

14 Human circulatory system is very important for humans.

- Because it transports the blood rich in gases and nutrients throughout the body.

15 Arteries play an important role in the human body.

- Because arteries carry the blood rich in oxygen and nutrients (glucose) from the heart to all body parts.

16 Veins play an important role in the human body.

- Veins return the blood that carries carbon dioxide gas and is low in nutrients and oxygen from the body cells to the heart.

17 Flowers have a great function for a plant.

- Flowers help the plant to reproduce as they produce seeds.

18 Seeds disperse in different ways.

- Because the way of seed dispersal depends on the shape and size of the seed.

19 Maple seeds can disperse by wind.

- Because they are light seeds.

20 Animals may disperse plum seeds

- Because plum seeds are rough and have spines so they stick to the animals' fur.



Unit 1 Concept 2

1 Food is very important for humans and animals.

- To get energy to live, grow and carry out vital processes.

2 Most insects are considered primary consumers.

- Because they feed on producers.

3 The ecosystem is very important for the survival of living organisms.

- Because an ecosystem provides living organisms with food and shelter.

4 A hawk is a meat-eating animal.

- Because a hawk eats snakes, fish, rabbits and mice.

5 Hawks depend on plants to get energy.

- Because hawks eat animals that eat plants.

6. The Sun is considered the main source of energy.
   - Because the energy of the Sun transfers to all living organisms on Earth.
7. Green plants are considered producers.
   - Because green plants can make their own food through photosynthesis.
8. Animals and humans are considered consumers.
   - Because they cannot make their own food, but they depend on other living organisms to get their energy.
9. Decomposers play important roles in the ecosystem.
   - They recycle nutrients back into the ecosystem.
   - They increase the soil fertility.
10. A food chain describes the food relationships among organisms.
   - Because food chains show the transfer of energy in the ecosystem when living organisms feed on one another.



Unit 1 Concept 3

1. A healthy habitat is very important for all living organisms.
   - Because it provides organisms with food, water and shelter.
2. Gentle rains benefit the desert ecosystem.
   - Because gentle rains help producers to grow, so the desert ecosystem is improved.
3. Heavy rains harm the ecosystem.
   - Because heavy rains lead to floods, so the desert ecosystem is harmed.
4. Microplastics have a bad effect on corals.
   - Corals filter the seawater to get food; so they ingest microplastics, which are toxic.
5. Plastics are so harmful for marine ecosystems.
   - Because plastics are toxic, sharp and not nutritious.
6. The nursery plays important roles in the recovery of coral reefs.
   - Because in a nursery, the small pieces of corals can grow healthy and reproduce.
7. Coral reefs are important for marine organisms and humans.
   - Coral reefs provide food and shelter for marine organisms.
   - Coral reefs are important for tourism (fishing or diving).



Unit 2 Concept 1

1 Air is matter.
- Because air has mass and takes up space.

2 Wood is a solid matter.
- Because wood has a definite shape and volume.

3 Oil is a liquid matter.
- Because it has a definite volume, but no definite shape.

4 Steam is a gaseous matter.
- Because it has no definite shape or volume.

5 Wood has a definite shape and volume.
- Because wood is a solid matter; its particles are very close to each other (packed tightly), and they move only a little bit.

6 Air has no definite shape or volume.
- Because the particles inside air have a lot of space between them and they move very freely.

7 A wooden cube keeps its shape when we change its position.
- Because its particles are very close to each other (packed tightly and held together).

8 Milk takes the shape of the container.
- Because milk is a liquid that has no definite shape.

9 Gases can escape into space.
- Because gas has no definite shape or volume and its particles are not held together; they move very quickly.

10 When you blow a balloon, the air takes its shape.
- Because air is a gas that has no definite shape or volume.

11 A chef put vegetables in a freezer.
- To freeze them and to keep them fresh for a longer time.

12 Models have an important role in learning.
- Because models help us see things in the right size and help us know how things work.



Unit 2 Concept 2

1. We use strong stone for building the roof of a desert home.
   - To protect the desert home from dust and dirt.
2. The roof of a cold-weather home is inclined and made of ceramic bricks.
   - To protect it from snow and rains.
3. The roof of a forest home is inclined and made of leaves and sticks.
   - To protect it from animals.
4. It is useful to measure different properties of matter.
   - Because measuring properties of each matter helps us know the suitable use for it.
5. When the particles of matter move quickly, its temperature increases.
   - Because when the particles move quickly, they produce more heat energy.
6. Rusting of iron is considered from the chemical properties of matter.
   - Because rusting of iron produces new matter (iron oxide).
7. Burning a paper is considered a chemical change.
   - Because burning a paper produces ash (a new substance with new properties).
8. It is safe to use helium gas.
   - Because helium is non-flammable and non-poisonous.
9. Balloons and blimps filled with helium gas rise in the air.
   - Because helium is lighter than air.
10. Copper is used to make cooking pots.
    - Because copper is a good conductor of heat.
11. Copper is used to make electric wires.
    - Because copper is flexible (can be stretched) and a good conductor of electricity.
12. Wood and plastic are used in making the handles of cooking pans.
    - Because they are bad conductors of heat.
13. Rubber is used to make tires and gloves.
    - Because rubber is waterproof and flexible.

14 Glass is used to make eyeglasses.
- Because it is transparent and smooth.

15 Steel is used in making screwdrivers and hammers.
- Because steel is hard and strong.



1 The oil takes the shape of the cup found in it.
- Because oil is a liquid matter that has no definite shape.

2 We can separate salt from water by heating for a long time.
- Because water evaporates when the temperature increases.

3 Freezing water is considered a physical change.
- Because the structure of the matter doesn't change.

4 Ice changes into water when it is left out of the refrigerator.
- Because when the temperature increases, the particles move faster and matter changes from the solid state into the liquid state.

5 Formation of bad odor of milk when it is left out of the fridge.
- Because a chemical change happens, so a new substance is formed.

6 When we add vinegar to baking soda, bubbles appear.
- Because a chemical change happens, so a new substance is formed.

7 Fruit salad and salt water are considered as mixtures.
- Because their components don't combine chemically.

8 Filtration process is used to separate sand from water.
- Because the particles of water are smaller than those of sand.

9 We cannot drink the water of oceans and seas.
- Because it is a mixture of water, salt, minerals, gases, living organisms and dead organisms.

10 Desalination has a great importance for human life.
- Because desalination helps us get fresh water from the seawater.

11 Desalination has some disadvantages.
- Because desalination is expensive, requires a lot of energy and some marine organisms may be sucked with the water.

5 What Happens If...?



Unit 1 Concept 1

1. A plant is placed in a dark place?
   - The plant can't make photosynthesis process and it will die.
2. Some bean seeds are placed in a wet paper towel and others are placed in the soil?
   - The plant placed in the soil grows faster than that placed in the wet paper towel.
3. Plants have no roots?
   - The plants will not absorb water and nutrients from the soil, so they will die
4. Plants have no leaves?
   - The plants won't be able to make their own food, so they will die.
5. The chlorophyll is absent?
   - The plant can't absorb the light energy from the Sun.
6. A celery stalk is placed in a glass of colored water?
   - The xylem color changes to the color of the water in the cup.
   - The color of the leaves changes to the color of the water in the cup.
7. Xylem is removed from the plant structure?
   - Water and nutrients won't be transferred to the leaves.
8. The human body doesn't contain arteries?
   - Oxygen and nutrients won't be able to reach the cells and organs.
9. A plant doesn't have stomata on its leaves?
   - Gases cannot move in and out of the plant.
10. There is no heart or blood vessels in the human body?
    - Blood cannot move through the human body.



Unit 1 Concept 2

1. All primary consumers disappear from a food chain?
   - The secondary consumers will move to another ecosystem to search for food or they will die.
2. Any organism in an ecosystem disappears?
   - The food web will be affected.
3. Any living organism dies?
   - Its body decomposes and the energy is recycled to the ecosystem.

4 The number of predators increases in an ecosystem?
- The number of other consumers will decrease.

5 Decomposers disappear from an ecosystem?
- Energy can't be recycled to the ecosystem and the Earth will be full of dead bodies.

6 The Sun is absent?
- Plants cannot make their food, so they will die.



1 The small lakes are exposed to extreme hot climate?
- The water in the lake will evaporate and the lake may completely disappear.

2 There are many top predators in a food web?
- Ecosystems get harmed because predators will eat all the prey.

3 Gentle rains fall on the desert?
- Grass will grow healthy and the ecosystem is improved.

4 Heavy rains fall on the desert?
- Grass will die and the ecosystem is harmed.

5 The grass is removed from an ecosystem?
- Primary consumers that feed on plants will die quickly.

6 The number of one species increases a lot (concerning the food resources)?
- Food resources will disappear and consumers will not find enough food, so they will die.

7 The number of secondary consumers decreases in an ecosystem?
- The number of primary consumers increases.

8 When the temperature of water containing microorganisms increases?
- Microorganisms will move away to cooler water.

9 The water temperature rises (concerning the coral reefs)?
- Coral bleaching happens and the coral reefs color turns to white.

0 The amount of plastics in water increases?
- Marine organisms will be harmed because plastic is toxic and sharp

1 You add a road in the forest for moving cars?
- It causes habitat loss for some living organisms.



1 Ice cubes are exposed to extreme heat?
- The ice will melt (changes from the solid state to the liquid state).

2 The water is boiling for a long time?
- Water will evaporate (changes from the liquid state to the gaseous state)

3 You leave a cup of milk in the freezer?
- It changes from the liquid state into the solid state.

4 Water is poured into a cup?
- Water will take the shape of the cup.

5 A liquid changes into a gas (considering the speed of the particles)?
- The speed of the particles increases.

6 We put the same amount of water in three different containers?
- The shape of water changes according to the shape of each container.

7 Water changes into ice (according to the particles)?
- The particles move slower and get closer to each other.

8 The particles of an ice is exposed to the Sun (according to the speed of th particles)?
- The particles move faster and move away from each other.

9 You blow a balloon up (according to its size)?
- The size of the balloon increases.



1 You approach a magnet to a piece of cork, stone and an iron nail?
- The magnet attracts the iron nail only.

2 We put a stone, a piece of wood and a piece of cork in a basin containing water?
- The stone will sink, but the wood and cork will float on the water.

3 A piece of paper is burned?
- It becomes ash.

4 We fill a balloon with helium gas?
- It will rise up in the air.

5 An electric wire is made from wood?
- It will not conduct electricity.

6. A cooking pan is made up of plastic?
   - It will not conduct heat.
7. The handles of a cooking pot is made up of metal?
   - Your hand will be burned because metals conduct heat.



1. We leave ice out of the freezer?
   - Ice will melt and change from the solid state (ice) into the liquid state (water).
2. We leave an iron nail exposed to wet air?
   - The iron nail will rust because iron reacts with the oxygen in the air and form a red layer of iron oxide.
3. A cup of water is put in the freezer?
   - The particles will move slower and get closer together, and the water will change from the liquid state to the solid state (ice).
4. Water is poured in an empty container?
   - Water will take the shape of the container.
5. A substance is heated or cooled (concerning its mass)?
   - Its mass remains constant.
6. Light energy or thermal energy is absorbed by matter (concerning the motion of the particles)?
   - The speed of the particles increases.
7. The particles of water lose energy?
   - They will move slower, get closer together, and change from the liquid state to the solid state (ice).
8. We add vinegar to baking soda?
   - Gas bubbles will appear.

6 Final Revision

All questions in this final revision are derived from official sources, such as:

1. Final governments' exams in 2022 and 2023
2. Egyptian knowledge bank questions
3. MOE Egypt Edu Stream



1 Choose the correct answer:

1 The human circulatory system consists of ______ .

a. the heart
b. veins
c. arteries
d. heart and blood vessels

2 Which of the following gases comes from the atmosphere and is absorbed by the leaves to make the plants' food?

a. Carbon dioxide b. Glucose c. Oxygen d. Hydrogen

3 Stomata are pores on the surface of a plant's ______ that allow air to pass through.

a. roots b. leaves c. stem d. flower

4 ______ carry the blood rich in oxygen and nutrients from the heart to all body parts.

a. Veins b. Stems c. Xylems d. Arteries

5 ______ carry the blood rich in carbon dioxide gas back to the heart.

a. Arteries b. Veins c. Lungs d. Xylems

6 Leaves contain ______ that captures the light energy and gives the leaves their green color.

a. a stoma b. chlorophyll c. glucose d. oxygen

7 The photosynthesis process takes place inside the ______ .

a. roots b. stems c. leaves d. flowers

8 Plants use energy from the ______ to produce their food from water and carbon dioxide gas.

a. batteries b. fire c. sunlight d. wind

9 Plants produce ______ as a source of energy to live and grow.

a. flowers
b. carbon dioxide gas
c. seeds
d. glucose (sugar)

10 The .... system moves the blood rich in gases and nutrients through the body.

a. digestive b. circulatory c. respiratory d. nervous

11 Plants use energy from the sunlight to produce their food from water and carbon dioxide gas through a process called ....

a. digestion b. photosynthesis c. evaporation d. breathing

12 Arteries carry the blood rich in .... from the heart to the organs.

a. oxygen b. nutrients c. carbon dioxide d. a and b

13 Plants and humans need .... to survive.

a. water b. air c. soil d. water and air

14 The .... carries water and nutrients from the plant roots to the leaves.

a. xylem b. leaf c. root d. air

15 Which part of the plant plays a similar role to the human circulatory system in order to maintain the survival of the plant?

a. Stem b. Roots

c. Leaves d. Transport system

16 The stem of the vine plant is a/an ....

a. wood stem b. upright stem c. climb stem d. tuber stem

17 The .... support(s) all plant parts and transport water and nutrients to the rest of the plant.

a. roots b. stem c. leaves d. flowers

18 Coconut seeds disperse by ....

a. water b. wind c. humans d. animals

19 Plum seeds disperse by sticking to animals' fur because they ....

a. are light seeds b. have spines

c. are heavy seeds d. float on water

20 .... seeds are light seeds, so they travel by wind.

a. Tomato b. Apple c. Coconut d. Maple

21 Photosynthesis process takes place inside the leaves of plants. What type of gas does a plant release during photosynthesis?

a. Nitrogen gas
b. Hydrogen gas
c. Oxygen gas
d. Carbon dioxide gas

22 The ______ of a plant get water and nutrients from the soil.

a. roots
b. stems
c. leaves
d. flowers

23 The ______ stem extends above the ground.

a. wood
b. upright
c. runners
d. tubers

24 During the photosynthesis process, the plant produces ______ as waste material.

a. carbon dioxide
b. oxygen gas
c. sugar
d. b and c

25 All the following organs are parts of the human circulatory system, except ______.

a. the heart
b. arteries
c. veins
d. lungs

26 Which part transports food from the leaves to the other parts of the plant?

a. Xylem tissue
b. Small roots
c. Chloroplast
d. Phloem

27 A plant makes its food inside its leaves when the sunlight combines with water and ______.

a. oxygen gas
b. the roots
c. the stems
d. carbon dioxide

28 Plants use ______ during the photosynthesis process.

a. food
b. oxygen gas
c. carbon dioxide gas
d. glucose

29 The way of seed dispersal depends on the ______ of the seeds.

a. temperature and weather
b. shape and size
c. color and odor
d. all the previous answers

30 A ______ stem is the stem that extends underground.

a. runner
b. tuber
c. climb
d. wood

2 Put (✓) or (✗):

1. The transport system in plants does the same function as the circulatory system in humans. ( )
2. Plants make their own food by respiration. ( )
3. Humans and plants can make their food by the photosynthesis process. ( )
4. The xylem helps the plant get water from the soil. ( )
5. Arteries carry the blood rich in oxygen to all body parts. ( )
6. All plants need soil to grow. ( )
7. The plant's stem has hairs that absorb oxygen gas from the air. ( )
8. A runner is a type of stem which extends underground. ( )
9. Air enters the plant through the roots. ( )
10. A phloem transports food materials from the leaves to other plant parts. ( )
11. Potatos have tuber stems which extend underground. ( )
12. A xylem transports water rich in nutrients from the soil to the leaves. ( )
13. Plants and humans are different in their ways of getting food. ( )
14. Plants produce carbon dioxide and glucose during the photosynthesis process. ( )
15. The method of seed dispersal depends on the shape and size of the seeds. ( )
16. Photosynthesis process takes place in the plant roots. ( )
17. The plant left in the dark has large numbers of green leaves. ( )
18. Sunlight is very important for the plant to survive. ( )
19. Coconut seeds can travel by wind because they are light seeds. ( )
20. Animals fur helps tomato seeds disperse. ( )



Correct the underlined words:

1. Chlorophyll in the plant's roots absorbs energy from the sunlight.
2. Potato plants have runner stems.
3. Plants make digestion process to make their own food.
4. Flowers allow gases to move in and out of the plant.
5. Shrubs have climb stems.
6. Stomata are responsible for the absorption of sunlight.
7. Plants take air through tiny holes on the stem called stomata.
8. The stem fixes the plant in the soil.
9. Plants use oxygen gas during the photosynthesis process.
10. Most flowers have climb stems.



Write the scientific term:

1. They fix the plant in the soil.
2. They are the reproductive parts of plants.
3. It's a part of the plant where sunlight allows carbon dioxide to combine with water during the photosynthesis process.
4. It's a part of the plant that supports the leaves and other plant parts.
5. It is found in the plant's leaves; it gives them their green color and absorbs energy from the Sun.
6. They're narrow holes spread on the plant's leaves that allow gases to come in and out of the plant.
7. The system that transports blood throughout the human body.
8. A blood vessel that carries the blood rich in carbon dioxide and low in oxygen.
9. Blood vessels carry oxygenated blood from the heart to all body parts.
10. The system that transports water, minerals, and sugars throughout the plant body.
11. They are tubes in the plant that transport food materials from the leaves to all plant parts.

12 The vessels in a plant through which water and nutrients move up from the roots to the leaves.

13 The primary source of energy for all organisms on Earth.

14 The process by which plants make their own food using the energy of sunlight.

15 It is the process of transporting seeds from one place to another.

16 It's the process of producing new plants.

17 It's a gas produced (released) during photosynthesis and is needed for the respiration of living organisms.

18 The gas that the plant needs to make the photosynthesis process.

19 It's a system full of water that contains important minerals for plants to grow.

5 Cross out the odd word:

1 Carbon dioxide gas - Water - Glucose sugar - Sunlight

2 Heart - Roots - Stems - Leaves

3 Green plant - Shelter - Water - Carbon dioxide gas

4 Arteries - Veins - Stem - Blood

6 Give reasons for:

1 Food is very important for humans.

2 Plants' roots have great functions.

3 Sunlight is very important for plants.

4 Plants are important for human life.

5 Chlorophyll is very important for plants.

6 The stem has a great function for plants.

7 Stomata have a great importance for plants.

8 Xylem and phloem are very important for plants.

9 Flowers have a great function for plants.

10 Photosynthesis process is very important for all living organisms.

7 What happens if:

1. A plant is placed in a dark place?
2. Bean seeds are placed on a wet paper towel and other seeds are placed in the soil?
3. Plants have no leaves?
4. Leaves have no chlorophyll?
5. Xylem is removed from the plant structure?

8 Complete the following sentences using the words between the brackets:

1. (xylem - Phloem - stomata - stems)
   a. .... transports the glucose from the leaves to other plant parts.
   b. Water and nutrients move up the plant's stem through the ....
   c. Potatoes have tuber ....
   d. The .... on the leaves allow gases to move in and out the plant.
2. (leaves - stem - seeds - roots)
   a. The .... supports all plant parts.
   b. A flower produces .... for reproduction.
   c. The .... fix the plant in the soil.
   d. Photosynthesis process is the process of making food inside the .... of the plant.
3. (water - carbon dioxide - nutrients - leaves - Flowers)
   a. Gases enter plants through the ....
   b. Plant roots absorb .... and .... from the soil.
   c. .... are the reproductive parts of many plants.
   d. Plants take .... gas from the air to make their food.
4. (Water - green leaves - Green plants - Sun)
   a. The .... in a plant are responsible for making its food.
   b. .... is a source of energy for the plant to make photosynthesis process.
   c. .... are living organisms that can make their own food.
   d. .... is a liquid substance that plants, animals and humans need to survive.

5 (carbon dioxide gas - sugar - stomata - water)

a. Without the .... in the leaves of plants, air can't move in or out the plant.

b. The food of a plant is a type of .... which is made in their leaves by photosynthesis process.

c. During photosynthesis process, ... and .... are changed into glucose.

9 Choose from column (A) what suits it in column (B):

A

Column (A)	Column (B)
1 Plants' roots	a. moves glucose from the leaves to other plant parts.
2 Phloem	b. transports water rich in nutrients up to the leaves.
3 Xylem	c. absorb water and nutrients from the soil.

1 .... 2 .... 3 ....

B

Column (A)	Column (B)
1 Chlorophyll	a. are the reproductive parts of the plant.
2 Flowers	b. captures the light energy from the Sun.
3 Roots	c. get water and nutrients from the soil.
	d. move the nutrients from the leaves to all plant parts.

1 .... 2 .... 3 ....

C

Column (A)	Column (B)
1 Potato	a. extends above the ground.
2 Runners stem	b. plant has climb stems.
3 Vine	c. plant has tuber stem.
	d. is the stem of most flowers.

1 .... 2 .... 3 ....



Column (A)	Column (B)
1 Tomato seeds	a. disperse by animals' digestive systems
2 Dandelion seeds	b. disperse by floating on water
3 Coconut seeds	c. disperse by wind
	d. disperse by sticking to animals' fur

1 .... 2  .... 3 ....

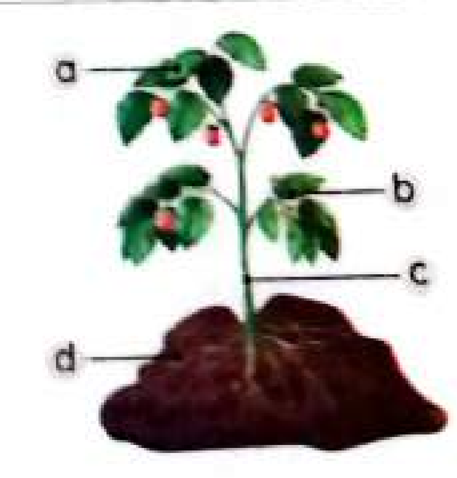
10 Answer the following questions:

1. Mention two methods of seed dispersal.
2. What are the main parts of a plant?
3. a. This figure represents the .... system.
   b. .... carry the blood rich in oxygen.
   c. Veins transport blood from the .... to the ....
4. Classify the following plants according to the way of dispersal:
   (By wind – Sticking to clothes – By water)

		
Plum seeds	Coconut seeds	Dandelion seeds

11 Complete the following sentences using the words between the brackets:

(Root – Leaves – carbon dioxide gas – glucose – water – Flower – Stem – oxygen gas – sunlight)



1. Label the opposite figure:
   a. .... b. ....
   c. .... d. ....
2. During photosynthesis process, the plant takes ...., ... and ....; to produce .... and ....

1 Choose the correct answer:

1 The desert food web starts with the ....
a. rabbit b. grass c. algae d. insects

2 Food chains include producers, consumers and decomposers. Which of the following is an example of one of these three species?
a. Grass, rabbit, fungi b. Leaf, eagle, robin
c. Seed, mouse, owl d. Fly, spider, mantis

3 .... is an area that consists of living organisms and nonliving things.
a. Ecosystem b. Space c. Sun d. Star

4 A snake is a predator for mice, while a snake is considered prey for ....
a. rabbits b. frogs c. eagles d. deer

5 Plants are considered .... that get their energy from the Sun.
a. decomposers b. consumers
c. producers d. nonliving things

6 The mouse eats grass and seeds, while the owl eats the mouse. This is an example of ....
a. meat-eating animals b. a food web
c. plant-eating animals d. a food chain

7 Any food chain starts with ....
a. producers b. decomposers c. fungi d. consumers

8 Choose the correct order of the food chain: ....
a. Plant → hawk → snake → mouse
b. Plant → mouse → hawk → snake
c. Plant → mouse → snake → hawk
d. Hawk → snake → mouse → plant

9 Insects are considered .... because they feed on producers.
a. producers b. primary consumers
c. decomposers d. secondary consumers

10 Which of the following living organisms is considered a producer?
a. Fungus b. Pine tree c. Snake d. Cow

11 A snake eats a rabbit which eats grass; the snake is a .... in the food chain.
a. primary consumer
b. secondary consumer
c. producer
d. tertiary consumer

12 Energy flows from one organism to another. Which is the correct direction of the energy flow?
a. From consumers to producers
b. From producers to consumers
c. From predators to prey
d. From producers to predators

13 .... in food webs are consumers.
a. Plants b. Predators c. Bacteria d. Algae

14 When a squirrel dies in the desert, its body will ....
a. grow b. freeze c. stay d. decompose

15 .... are organisms that eat other living organisms to get their energy.
a. Producers
b. Consumers
c. Plants
d. Decomposers

16 .... is the process which happens to all dead organisms.
a. Decomposition b. Breathing c. Photosynthesis d. Digestion

17 All the following are consumers, except ....
a. animals b. humans c. birds d. worms

18 All the following are decomposers, except ....
a. grass b. fungi c. millipeds d. bacteria

19 .... is/are consumers.
a. Plants b. Grass c. Humans d. Bacteria

20 .... always benefit the soil.
a. Decomposers b. Consumers c. Rabbits d. Snakes

21 If there are no predators in an ecosystem, the other consumers will ....
a. die b. not be affected c. increase d. decrease

22 What is the scientific term for the complex interactions between producers, consumers, and predators?
a. A suitable environment
b. Food chain
c. Food web
d. The natural habitat

23 Food webs show ....
a. nonliving things in the environment
b. multiple feeding relationships between living organisms
c. the way heat is retained in the environment
d. substances polluting the atmosphere

2 Put (✓) or (✗):

1 Food webs show how many organisms share food resources within ecosystems. ( )
2 Producers and bacteria are considered examples of consumers. ( )
3 Consumers complete the decomposition process. ( )
4 A food web is made up of two food chains or more. ( )
5 Consumers come after decomposers in the food chain. ( )
6 Decomposers include worms, locusts and fungi. ( )
7 Photosynthesis process is very important for life on Earth. ( )
8 Any food chain starts with a consumer. ( )
9 Energy does not flow between two consumers at the beginning of a food chain. ( )
10 Hawks, crocodiles, and sharks are producers. ( )
11 Seeds and carrots are examples for producers. ( )
12 In an ecosystem that contains only rabbits, mice, snakes, and eagles, if snakes disappear completely, the number of rabbits will increase. ( )
13 The relationship between grass and rabbit is a "prey-predator" relationship. ( )
14 Birds are tertiary consumers because they eat insects that feed on plants. ( )
15 The consumer eaten by another consumer is known as a predator. ( )
16 Dead organisms need energy. ( )
17 Consumers use carbon dioxide gas to make their food. ( )

18 Humans and animals are consumers. ( )

19 The food web will be damaged if the producers die. ( )

20 Producers and decomposers can make their own food. ( )

21 The grass-eating animals are the primary consumers in the food chain. ( )

22 Plants and humans are different in their ways of getting food ( )

3 Complete the following sentences using the words between the brackets:

(Predator - decomposition - Humans - ecosystem - animals - energy - millipedes - producers - Food web - food - Worms - secondary)

1 The .... process restores the energy to the ecosystem.

2 When a hawk eats a snake, this means that the hawk is a ....

3 An .... is an area that provides food, water, and shelter to all living organisms that live there.

4 .... and .... are consumers.

5 Both humans and animals cannot produce their own ....

6 .... is an interaction of a food chain.

7 In any food chain, plants are considered a ....

8 .... and .... are two types of decomposers.

9 In a food chain, the energy flows from a primary consumer to a .... consumer.

10 A food web is a model that describes the .... flow between living organisms in an ecosystem.

4 Write the scientific term:

1 It's a natural process through which the nutrients found in dead organisms' bodies return to the ecosystem.

2 The final link in the food chain.

3 It's a group of living organisms that can produce their own food.

4 They are animals that eat plants.

5 They are consumers that feed on primary consumers.

6 It's a group of living organisms that feed on secondary consumers.

7 It is a model that shows one linear set of feeding relationships and energy flow between living organisms.
8 The animal that is eaten by another animal.
9 It's a community that contains living organisms and nonliving things.
10 It's a group of interconnected food chains.
11 It is the primary source of energy for all living organisms on Earth.

5 Cross out the odd word:

1 Foxes - Lions - Tigers - Frogs
2 Eagle - Hawk - Rabbit - Crocodile
3 Bacteria - Cows - Birds - Snakes

6 Choose from column (A) what suits it in column (B):

A

Column (A)	Column (B)
1 Producers	a. increase soil fertility.
2 Decomposers	b. is made up of several interconnected food chains.
3 Food web	c. is a process in which the nutrients are returned to the ecosystem.
4 Decomposition process	d. get energy from the Sun.

1 .... 2 .... 3 .... 4 ....

B

Column (A)	Column (B)
1 Prey	a. are animals that feed on other animals
2 Secondary consumers	b. are organisms which eat animals that eat plants.
3 Primary consumers	c. are organisms that eat plants.
4 Predators	d. are animals that are hunted by other animals.

1 .... 2 .... 3 .... 4 ....

7 Give reasons for:

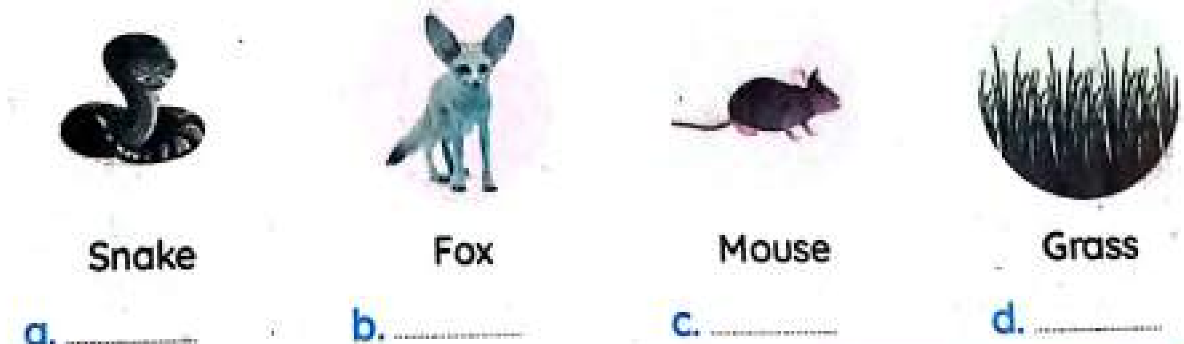
1. A rabbit is considered a primary consumer.
2. An ecosystem is very important for the survival of living organisms.
3. A hawk is a meat-eating animal.
4. Hawks depend on plants to get energy.
5. The Sun is considered the main source of energy.
6. Green plants are considered producers.
7. Animals and humans are considered consumers.
8. Decomposers play an important role in the ecosystem.

8 What happens if:

1. All primary consumers disappear from a certain food chain?
2. An organism in an ecosystem disappears?
3. A living organism dies?
4. Producers (grass) are removed from any ecosystem?
5. The number of predators increases in an ecosystem?
6. Decomposers disappear from an ecosystem?

9 Answer the following questions:

1. Arrange the following to form a food chain:



a. .... b. .... c. .... d. ....

2. a. The opposite figure represents a ....
(food chain – food web)

b. Form a food chain that includes a producer, a primary consumer, and a secondary consumer.



Revision

Concept 1.3
Changes in Food Webs

1 Choose the correct answer:

1 The process that happens to all dead organisms is known as ....
a. respiration
b. photosynthesis
c. digestion
d. decomposition

2 All the following organisms are considered producers, except ....
a. hawks
b. algae
c. green plants
d. marine microorganisms

3 All the following destroy the ecosystem, except ....
a. gentle rain
b. heavy rain
c. drought
d. pollution

4 If the grass is removed from an ecosystem, ... will die first.
a. producers
b. primary consumers
c. secondary consumers
d. decomposers

5 Energy could be recycled back into the ecosystem by the ....
a. predators
b. prey
c. consumers
d. decomposers

6 Corals get harmed when ....
a. water becomes too warm
b. they ingest microplastics
c. fish take them as shelter
d. a and b

7 The food chain describes the process by which .... are transferred among living organisms in an ecosystem.
a. consumers
b. decomposers
c. producers
d. energies

8 If the climate is suitable, the population of a species will ....
a. remain constant
b. become zero
c. decrease
d. increase

9 Which of the following human activities harm marine ecosystems?

a. Overfishing
b. Throwing wastes in water
c. Climate change
d. All the previous answers

10 All the following examples represent human bad activities, except ....

a. overfishing
b. pollution
c. floods
d. cutting trees

11 .... are considered top predators.

a. Tigers
b. Rabbits
c. Frogs
d. a and c

12 Algae in coral reefs provide food for .... directly.

a. primary consumers
b. secondary consumers
c. producers
d. top predators

13 In any food chain, the symbol (⟶) represents the transfer of ....

a. pollution
b. force
c. energy
d. motion

14 As the result of pollution in an ecosystem, the number of living organisms ....

a. decreases
b. increases
c. doesn't change
d. is doubled

15 .... live on the top of mountain cliffs and feed on small fish.

a. Turtles
b. Corals
c. Algae
d. Seabirds

16 All the following cause habitat loss, except ....

a. adding roads
b. recycling plastic
c. overfishing
d. throwing waste in water

17 The main source of energy on Earth is ....

a. the Sun
b. humans
c. decomposers
d. consumers

2 Complete the following sentences using the words between the brackets:

1. The marine food web starts with .... (algae - parrotfish)
2. Heavy rains may .... the desert ecosystem. (improve - destroy)
3. Rabbits die quickly when .... disappear(s) from the ecosystem. (hawks - grass)
4. Seabirds feed on small fish; they build their nests .... (in water - on the top of mountain cliffs)
5. .... have bad effect on the marine life. (Plastics - Coral reefs)
6. Coral reefs .... the seawater to get their food. (filter - pollute)
7. When coral bleaching happens, corals will .... (die - grow healthy)
8. The water of a lake .... during extreme hot climate. (increases - decreases)
9. Habitat restoration projects .... the ecosystem. (benefit - harm)
10. Pollution harms the ecosystem as the number of living organisms .... (decreases - increases)
11. .... can make their own food. (Fish - Microorganisms)
12. Gentle rain .... the desert ecosystem. (harms - improves)
13. The .... of water temperature causes the migration of microorganisms to other habitats. (increase - decrease)

3 Write the scientific term:

1. They are consumers that exist at the top of food chains.
2. They're living organisms that recycle the energy into the ecosystem.
3. They are consumers that feed on secondary consumers.
4. It's a group of interconnected food chains.
5. It is an area in the ocean where scientists take care of small pieces of corals until they grow up.

6 They're flying living organisms that build their nests on the top of mountain cliffs and feed on small fish.

7 It is the number of organisms of one type of species living in an area.

8 It's the increase or decrease in the number of species of living organisms in an environment.

9 A human activity that affects marine food webs and makes the number of fish decrease.

10 They're small pieces of plastics in the size of rice grains.

11 The process of returning a habitat back to its natural state.

12 They're small organisms that live in cold and are considered producers in the marine food web.

13 When water temperature rises up, the coral reef turns completely into white.

4 Put (✓) or (✗):

1 Corals and sea urchins are examples of top predators in the marine ecosystem. ( )

2 Seabirds feed on small fish to get energy. ( )

3 A healthy marine habitat provides living organisms with food and shelter. ( )

4 People and engineers must help scientists in restoration ecology. ( )

5 When water temperature decreases, coral bleaching happens. ( )

6 If coral reefs are destroyed, many marine food chains will be destroyed. ( )

7 Microorganisms are producers in some marine food chains. ( )

8 Habitat loss may cause extinction of any species of animals. ( )

9 Consumers may migrate if the producers were removed from the ecosystem. ( )

10 A desert food chain doesn't contain any type of fish. ( )

11 If organisms disappear in the ecosystem, this may lead to the destruction of the ecosystem. ( )

12 Top predators are consumers that exist at the top of food chains. ( )

13 Energy transfers from consumers to producers. ( )

14 Heavy rain harms the desert ecosystem. ( )

15 Coral reefs are considered producers. ( )

16 Plastic pollution harms the marine environment. ( )

5 Correct the underlined words:

1 Using wooden forks and cloth grocery bags increase the plastic pollution.

2 Gentle rain causes floods and damages the desert ecosystem.

3 Plastic is healthy and smooth, so it causes harm to the marine living organisms.

4 Human is considered a producer.

5 Algae are producers in the desert ecosystems.

6 Give reasons for:

1 A healthy habitat is very important for all living organisms.

2 Gentle rains create a healthy ecosystem.

3 Microplastics have bad effects on corals.

4 Heavy rains harm the ecosystem.

5 Plastics are so harmful for marine ecosystems.

6 The nursery plays an important role in the recovery of coral reefs.

7 Coral reefs are important for marine organisms and humans.

7 What happens if:

1 The water temperatures rises (concerning coral reefs)?

2 The temperature of water containing microorganisms increases?

3 The number of one species increases a lot (concerning food resources)?

4 The small lakes are exposed to extreme hot climate?

5 The amount of plastics in water rises?

6 The coral reefs are bleached?

7 Seawater becomes warm (concerning microorganisms)?

8 Sunlight falls on the plastic waste in an ocean?

9 Heavy rains fall on the desert?

10 The grass is removed from an ecosystem?

8 Complete the following sentences using the words between the brackets:

1 (flooding - extinction - consumers - decomposers)

a. Fungi and bacteria are two types of ....

b. Habitat loss is one of the main causes of ....

c. In food chains, energy transfers from producers to ....

d. Heavy rain causes .... which destroys the desert ecosystems.

2 (ecosystem - increases - nursery - decreases)

a. When the number of secondary consumers decreases, the number of primary consumers .... and the amount of producers ....

b. An .... is an area that provides food, water, and shelter to all living organisms that live there.

c. A .... is the area in the ocean where the small pieces of corals are nurtured.

3 (producers - Energy - shelter - primary consumers)

a. .... transfers between animals in a food web to help them do their activities and survive.

b. Marine microorganisms are ....

c. Secondary consumers can eat ....

d. Coral reefs provide marine organisms with ....

4 (sea turtles - coral reefs - small fish - microorganisms)

a. Seabirds feed on ______ .

b. Some marine animals cannot differentiate between food and plastic, such as ______ .

c. The ______ are from the most diverse ecosystems.

d. When water becomes warm, ______ will move to cooler water.

5 (energy - pollution - Seabirds - coral bleaching)

a. When water temperatures rises, ______ happens.

b. Throwing plastic waste into a river causes water ______ .

c. When a predator feeds on prey, the predator gets ______ from the prey.

d. ______ dive deep down into the sea to feed on small fish.

6 (Microplastics - cold - Pollution - die - warm)

a. Microorganisms live in ______ water.

b. If the grass was removed from the ecosystem, primary consumers that feed on plants will ______ .

c. ______ is the harm that happens to air, soil, and water due to human bad activities.

d. ______ and ______ water harm the coral reefs.

7 (Sun - floods - Small fish - producers - tertiary consumers)

a. Heavy rain in the desert lead to ______ which harm the ecosystem.

b. ______ feed on microorganisms floating on the surface of the sea.

c. Microorganisms are considered ______ .

d. Microplastics are formed when plastic is broken down by the ______ .

e. Secondary consumers are considered prey for ______ .




9 Choose from column (A) what suits it in column (B):

A

Column (A)	Column (B)
1 Microorganisms	a. means the increase or decrease in the number of one species in any area.
2 Population Change	b. are small plastic pieces that are even smaller than a grain of rice.
3 Microplastics	c. are producers in the marine food web.

1 .... 2 .... 3 ....



B

Column (A)	Column (B)
1 Habitat	a. is one of the main causes of extinction.
2 Nursery	b. is the environment that the living organism lives in.
3 Habitat loss	c. is an area in the ocean where the small pieces of corals are nurtured.

1 .... 2 .... 3 ....



C



Column (A)	Column (B)
1 Overfishing	a. makes the desert ecosystem get better.
2 Gentle rain in the desert	b. leads to floods.
3 Heavy rain in the desert	c. may destroy the marine ecosystem.

1 .... 2 .... 3 ....

D

Column (A)	Column (B)
1 Coral bleaching	a. can make their own food.
2 Seabirds	b. means the coral turns into white.
3 Microorganisms	c. are primary consumers.
4 Clams	d. dive to search for food.

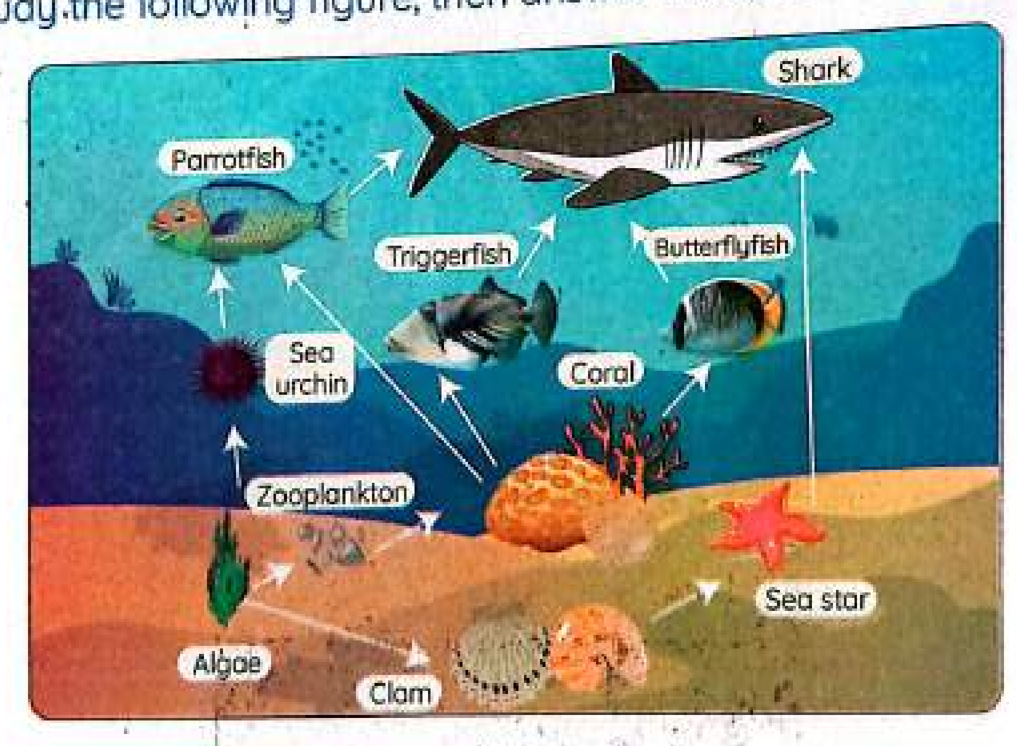
1 .... 2 .... 3 .... 4 ....





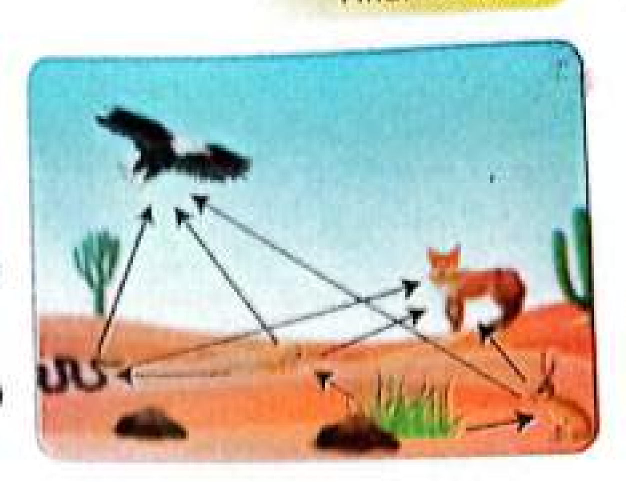
10 Answer the following questions:

1. What are the reasons of losing a habitat?
2. Mention one of the human activities that affect the marine environment.
3. Form food chains from the following living organisms:
   - a. Rabbit - hawk - snake - green plant
   - b. Parrotfish - algae - shark - coral
   - c. Sea star - algae - shark - clam
   - d. Human - grass - chicken
   - e. Snake - carrot - hawk - rabbit - fungi
   - f. Duck - grass - fox - bacteria
   - g. Giraffe - lion - fungi - acacia tree
4. Study the following figure, then answer the questions:



- a. This figure represents a .... ecosystem.
- b. .... are considered producers.
- c. .... can feed on seaurchins or corals.
- d. .... and .... feed on algae.
- e. .... is the top predator.

5 Study the opposite figure, then answer the questions:

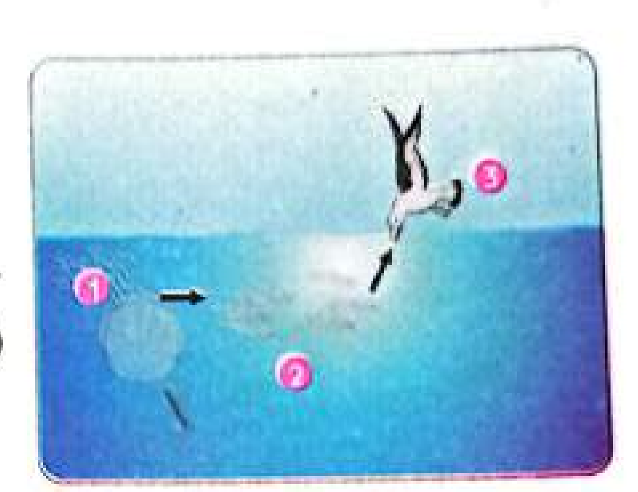


a. This figure represent a ________ .
(food web - food chain)

b. ________ harms this ecosystem.
(Gentle rain - Heavy rain)

c. The ________ is considered a top predator. (mouse - eagle)

6 Study the opposite figure, then choose the correct answer:



a. This food chain represents a ________ . (marine food chain - desert food chain)

b. ________ are considered producers of this ecosystem.
(Algae - Microorganisms)

7 Study the following figure, then answer the questions:



a. This figure represents ________ .

b. It happens when the temperature of water ________ .

Revision

Concept 2.1

Matter in the World Around Us

1 Choose the correct answer:

1. .... is an example of gaseous matter.
   a. Oil b. Air c. Wood d. Milk
2. The movement of particles of water is slower than those of ....
   a. wood b. glass c. plastic d. oxygen
3. Which of the following matter has no definite volume or shape?
   a. Ice b. Water c. Oil d. Oxygen
4. A .... is used to measure the weight of objects.
   a. measuring cup b. thermometer
   c. meter d. spring scale
5. How are solids unique from other forms of matter?
   a. Solids take the shape of any container.
   b. Solids have a definite size and shape.
   c. Solids can be poured.
   d. Solids fill whatever container they are put in.
6. All matter is made of ....
   a. molecules b. proteins c. cells d. atoms
7. Matter is ....
   a. anything that has mass only
   b. anything that has mass and takes up space
   c. only water in different states d. only solids
8. Ice is an example of the .... state of water.
   a. solid b. gaseous c. liquid d. a & b
9. .... has a definite volume and no definite shape.
   a. Air b. Ice c. Water d. Wood
10. We can measure the temperature using a ....
   a. thermometer b. scale
   c. meter stick d. measuring tape

11 All the following examples represent solid states, except ....

a. oil
b. books
c. wood
d. rocks

12 Water takes the .... of its container.

a. volume
b. mass
c. color
d. shape

13 Which matter has a definite shape and a definite volume?

a. Water
b. Ice
c. Oil
d. Air

14 Particles of .... vibrate around their places.

a. oxygen
b. wood
c. water
d. vinegar

15 All of these substances are gases, except ....

a. water vapor
b. oxygen
c. air
d. stone

16 An example of liquid is ....

a. vinegar
b. rock
c. pencil
d. oxygen

17 Water can be found in a gaseous state in the form of ....

a. ice
b. water vapor
c. oxygen
d. frozen water

18 The .... matter can be poured in any container.

a. liquid
b. gaseous
c. solid
d. b and c

19 If ice is transferred from a container to another, its volume ....

a. increases
b. doesn't change
c. decreases to its half
d. doubles

20 Scientists use .... to see the components of one blood cell.

a. regular microscopes
b. naked eyes
c. medical glasses
d. electron microscopes

2 Write the scientific term:

1 It's the state of water after its freezing.

2 It's anything that has mass and occupies space.

3 It's the state of matter that has a fixed shape and volume.

4 It's the state of matter in which the particles vibrate or move around their places.

5 It's the state of matter that has a definite volume, but no definite shape
6 It's the state of matter that has no definite shape or volume.
7 It's the state of water when its temperature is between 0°C and 100°C
8 It's a state of matter that can be poured in a container and takes its shape.
9 It's the state of matter that keeps its shape and its particles are packed tightly
10 It's the state of matter in which the particles have a lot of energy and move very freely.
11 It's a tool that is used to measure the length of a wall or room.
12 It's a device that is used to measure the weight of an object.
13 They are the building units of matter.
14 It is a measurement of the amount of matter.
15 It's the property of matter which is measured by a measuring cup.
16 It's a process in which ice changes into water.
17 It's a process in which water changes into ice.
18 It is a copy that is similar to the real thing.
19 It's a model of the whole world that is made in the shape of a large bal

3 Put (✓) or (✗):

1 When you blow a balloon, the particles of air move very slowly. ( )
2 Water vapor is the solid state of water. ( )
3 Particles inside matter are in a continuous motion. ( )
4 All states of matter have the same properties. ( )
5 In a gaseous state, the particles can keep their shape. ( )
6 A liquid has a definite shape and volume. ( )
7 Matter can so small that we can't see it, such as germs. ( )
8 Models help us see germs without a microscope. ( )
9 Particles of gas are packed tightly together. ( )
10 Milk takes the shape of the container that it is poured in. ( )
11 All matter are made up of very large particles. ( )

12 Matter has four states. ( )

13 Models are a great way to see things at the right size. ( )

14 A solar system model tells us about planets; which one is the biggest and which one is the closest to Earth. ( )

15 To measure the height, we use scales. ( )

16 Scientists use regular microscopes to see the components of one blood cell. ( )

17 Particles of gold are different from the particles of iron. ( )

18 Solids can be poured and take the shape of their container. ( )

19 The particles of ice move faster than the particles of water. ( )

20 Matter can change from one state to another. ( )

4 Cross out the odd word:

1 Plastic - Iron - Water - Wood

2 Water - Milk - Sand - Oil

3 Sound - Light - Ice

4 Oil - Milk - Wood - Tea

5 Air - Water vapor - Ice - Carbon dioxide gas

6 Water - Air - Light - Wood

5 Give reasons for:

1 Salt is matter.

2 A book has a definite shape and a definite volume.

3 Wood is a solid matter.

4 Oil is considered a liquid.

5 Steam is a gaseous state.

6 Air has no definite shape or volume.

7 Solid particles can keep their shape.

8 The chef puts vegetables in a freezer or refrigerator.

6 What happens if:

1. Ice cubes are exposed to heat (concerning the state and the speed of the particles)?
2. Water boils for a long time?
3. You leave a cup of milk in the freezer?
4. Water is poured into a cup of water?
5. Liquid changes into gas (concerning the speed of the particles)?

7 Complete the following sentences using the words between the brackets:

1. (Volume - gaseous - solid - Matter)
   a. ______ is anything that has mass and takes up space.
   b. Water vapor is an example for ______ state.
   c. The volume and shape don't change in the ______ matter.
   d. ______ is the amount of space that the matter takes.
2. (solar system - gaseous - Earth - solid)
   a. In ______ state, the particles are packed tightly together.
   b. A ______ model shows us all planets.
   c. The particles inside a ______ move very freely.
   d. A globe is a model of the ______ .
3. (freely - slowly - gaseous - microscopes - measuring tape - Liquid)
   a. The particles of the gaseous state move ______ .
   b. ______ is a state of matter that can be poured and takes the shape of the container.
   c. You can use a ______ to measure the length of a table.
   d. In ______ matter, the particles have a lot of energy.
   e. Scientists use ______ to see tiny particles.
4. (definite - Volume - no definite - shape)
   a. ______ is the amount of space occupied by matter.
   b. Gas has ______ volume.
   c. Water takes the ______ of its container.
   d. Solids have ______ shapes.

5 (Oil - gold - particles - mass - gaseous)

a. Particles of .... are very close to each other.

b. .... is a liquid state of matter.

c. The volume and shape change in the .... state

d. Matter consists of very tiny identical ....

e. Matter is anything that has .... and occupies space.

8 Choose from column (A) what suits it in column (B):

A

Column (A)	Column (B)
1 Gaseous state	a. in which the particles are packed in a neat and ordered arrangement, so that they can keep their shape.
2 Liquid state	b. in which the particles are not held together and move very quickly.
3 Solid state	c. in which the particles are held together more loosely and take the shape of their container.

1 .... 2 .... 3 ....

B

Column (A)	Column (B)
1 Oxygen	a. Solid state
2 Desk	b. Liquid state
3 Juice	c. Gas state

1 .... 2 .... 3 ....

C

Column (A)	Column (B)
1 Matter	a. is a copy that is similar to the real thing.
2 Temperature	b. is anything that has mass and takes up space.
3 Model	c. is one of the properties of matter that is used to measure how hot or cold the matter is.

1 .... 2 .... 3 ....

D

Column (A)	Column (B)
1 Ice	a. takes the shape of the container, and its particles are not so near.
2 Water	b. has a fixed shape, and its particles are very near to each other.
3 Water vapor	c. does not have a fixed shape, takes up all the space of the container and the particles are far from each other.

1 .... 2 .... 3 ....

9 Classify the following:

Oil – Water vapor – Glass - Wood – Nitrogen – Water

Solid	Liquid	Gas
....	....	....
....	....	....

10 Answer the following questions:

1 a. Which model is the biggest in real?

(Model 1 – Model 2)

b. A globe represents a model of ....

c. The Earth is a planet in the .... system.



Model (1)



Model (2)

2 Look at the following figure that represents the particles of milk, air and wood:

Figure (1)	Figure (2)	Figure (3)

a. Figure 1 represents the particles of ....

b. Figure 2 represents the particles of ....

c. Figure 3 represents the particles of ....

Concept 2.2

Describing and Measuring Matter

1 Choose the correct answer:

1. Thermometers can be used to measure the ....
   a. shape b. color c. temperature d. weight
2. All the following are measuring units of volume, except ....
   a. liters b. milliliters c. cubic centimeters d. kilograms
3. Roofs are used to protect us from ....
   a. dust and dirt b. rain water entering inside c. animals entering inside d. all the previous answers
4. A non-flammable gas that is used to fill balloons is .... gas.
   a. hydrogen b. helium c. oxygen d. water vapor
5. A book length or width can be measured using a ....
   a. ruler b. thermometer c. scale d. measuring cup
6. Steel is used in making hammers because it is ....
   a. hard b. soft c. waterproof d. transparent
7. The volume of one liter of water has a mass of ....
   a. one gram b. one kilogram c. one meter d. one kilometer
8. Tropical rainforest home roofs are made up of ....
   a. leaves and sticks b. ceramic bricks c. strong stones d. sand
9. Copper is used to make ....
   a. electric wires b. cooking pots c. windows d. a and b
10. 1 kilogram = ... grams
    a. 10 b. 100 c. 1 d. 1,000
11. .... is a property of matter which is measured by the tape measure.
    a. Mass b. Length c. Volume d. Temperature
12. All the following are from the physical properties of matter, except ....
    a. color b. shape c. ability to burn d. temperature

13 Which of the following homes have inclined ceramic bricks roofs?
a. desert homes
b. cold-weather homes
c. tropical rainforest homes
d. desert and tropical rainforest homes

14 Gram is the measuring unit of ....
a. mass b. length c. volume d. temperature

15 Volume is the amount of .... that matter takes up.
a. mass b. length c. space d. temperature

16 A .... is used to measure the mass of objects.
a. ruler b. measuring tape c. balance d. thermometer

17 .... is a property of matter which is measured by the measuring cup.
a. Mass b. Length c. Volume d. Temperature

18 Which of the following are attracted to magnets?
a. A stone
b. An iron nail
c. A piece of wood
d. A piece of cork

19 We use .... to make gloves.
a. glass b. steel c. rubber d. copper

20 .... is a transparent material that is used to make eyeglasses and windows.
a. Glass b. Steel c. Rubber d. Copper

21 We use .... to make the handles of cooking pans.
a. plastic
b. wood
c. copper
d. plastic and wood

2 Write the scientific term:

1 It's the ability of materials to transfer heat and conduct electricity.
2 It's a device that is used to measure the volume of liquids.
3 It is everything around us that has mass and takes up space.
4 They are the properties that can be observed or measured without any change in the matter.
5 It's the property of matter which is measured by a thermometer.
6 They are materials that are used to build the roofs of desert homes.
7 It's a tool that is used to measure the lengths of materials.
8 It is the amount of matter in an object.
9 It is the amount of space that the matter takes up.

10 It's a non-flammable gas that is used to fill balloons and blimps.
11 It's matter that is used to make electric wires and cooking pans.
12 It's a hard and strong matter that is used to make hammers and screwdrivers.
13 It's a transparent and smooth matter that is used to make eyeglasses and windows.
14 It's a flexible waterproof matter that is used to make tires and gloves.

3 Put (✓) or (✗):

1. A measuring cup is used to measure the length of an object. ( )
2. Color, texture, odor, and shape are considered physical properties. ( )
3. Glass is used to make tires because it is flexible. ( )
4. Floating and sinking depend on the object's mass. ( )
5. When a wooden cube is placed in a glass of water, it will float. ( )
6. We can observe some physical properties with our five senses. ( )
7. The length of a book can be measured in liters. ( )
8. When the shape of a material changes, its mass isn't affected. ( )
9. We can differentiate between iron and copper by their sight. ( )
10. Helium is a flammable, poisonous gas. ( )
11. Copper can be stretched into a thin, flexible wire. ( )

4 Correct the underlined words:

1. The roof of a desert home is slanted.
2. A thermometer is a tool used to measure the mass of materials.
3. The roof of a cold-weather home is made up of strong stone.
4. A balance is the measuring unit of mass.
5. The roof of a tropical rainforest home is made up of ceramic tiles.
6. A measuring tape is a tool used to measure the volume of materials.
7. Kilogram is a measuring tool of length.
8. A paperclip has a mass of about 1,000 g.
9. One liter of water has a mass of one gram.
10. When particles of matter move quickly, they produce light energy.
11. We use steel to make electric wires because it is a good conductor of electricity.
12. The handles of cooking pans are made up of copper.

5 Give reasons for:

1. It is safe to use helium gas.
2. Balloons that are filled with helium gas rise up in the air.
3. Copper is used to make cooking pots.
4. The roof of a desert home is made of strong stones.
5. The roof of a cold-weather home is inclined and is made of ceramic bricks.
6. The roof of a tropical rainforest home is made of leaves and sticks.
7. Wood and plastic are used in making the handles of cooking pans.
8. Copper is used in making electric wires.

6 What happens if:

1. The roof of a cold-weather home is flat?
2. A piece of paper is burned?
3. A magnet is put close to an iron nail and a plastic spoon?
4. A piece of cork is put in water?
5. An electric wire is made from plastic instead of copper?

7 Choose from column (A) what suits it in column (B):

A

Column (A)	Column (B)
1 Steel	a. is used to make tires.
2 Rubber	b. is used to make cooking pans.
3 Copper	c. is used to make eyeglasses.
4 Glass	d. is used to manufacture screwdrivers.

1 .... 2 .... 3 .... 4 ....

B

Column (A)	Column (B)
1 Balance	a. are from the measuring units of mass.
2 Gram - kilogram	b. are from the measuring units of volume.
3 Measuring cup	c. is a tool that is used to measure volume.
	d. is a tool that is used to measure mass.

1 .... 2 .... 3 ....



Column (A)	Column (B)
1 The roof of a desert home	a. is made up of leaves and sticks.
2 The roof of a cold-weather home	b. is made up of ceramic bricks.
3 The roof of a tropical rainforest home	c. is made up of strong stones.

1 .... 2 .... 3 ....

8 Complete the following sentences using the words between the brackets:

(1 gm – physical – chemical – 1 kg – Conduction – flat – inclined)

a. .... is the ability of the material to transfer heat and conduct electricity.

b. Odor and shape of matter are considered from the .... properties of matter.

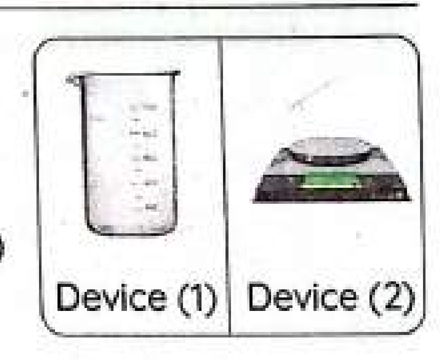
c. The ability of rust is from the .... properties of matter.

d. The roof of a cold-weather home is ...., while the roof of a desert home is ....

e. A paperclip has a mass about ....

9 Answer the following questions:

1 look at the opposite figures, then answer the questions:


Device (1) Device (2)

a. Which device is used to measure volume? (Device 1 – Device 2)

b. We can measure the volume by ...., and .... units.

2 We have an iron nail with a mass of 20 grams.

If we change its shape, its mass would be .... grams. (15 – 20 – 35)



3 The mass of a big bottle containing 1 liter of water is ....



Revision

Concept 2.3

Comparing Changes in Matter

1 Choose the correct answer:

1. .... changes describe how one matter reacts with another matter.
   a. Chemical   b. Physical   c. Biological   d. Break
2. .... changes the matter from a gaseous state to a liquid state.
   a. Evaporation   b. Boiling   c. Condensation   d. Freezing
3. .... is considered a chemical change.
   a. Cutting vegetables   b. Boiling water
   c. Baking a cake   d. Melting a chocolate
4. All the following are examples for chemical changes of the matter except ....
   a. adding baking soda to the batter to bake bread
   b. melting iron and reforming it
   c. the reaction of water with carbon dioxide inside the leaves
   d. burning of a paper
5. .... process is used to separate salt from salt water.
   a. Evaporation   b. Melting   c. Respiration   d. Digestion
6. When the water is cooled, its particles ....
   a. move slower   b. move faster
   c. move with the same speed   d. do not move
7. We can use .... process to separate sand from sand-water mixture.
   a. filtration   b. evaporation   c. melting   d. freezing
8. We can turn ice into water by ....
   a. heating   b. cooling   c. freezing   d. rusting
9. By decreasing the temperature of water, it ....
   a. condenses   b. freezes   c. melts   d. evaporates

10 Producing ash from the burning of wood is considered a ____ change.

a. chemical b. physical c. freezing d. melting

11 The change of the temperature affects the ____ .

a. shape only b. state only c. color d. a and b

12 All the following are chemical changes, except ____ .

a. digestion of food b. striking a match

c. adding vinegar to baking soda d. cutting a cloth

13 On increasing the temperature of water (heating), it ____ .

a. freezes b. melts c. condenses d. evaporates

14 ____ is an example of the physical changes.

a. Iron rust b. Rotting of fruits

c. Condensation d. Making bread

15 When the water temperature decreases, water changes into ____ .

a. ice b. water vapor c. steam d. oxygen

16 Which of the following are examples of mixtures?

a. Sand and rock b. Ocean water

c. Atmosphere d. All the previous answers

17 When water evaporates, it changes from a ____ state to a ____ state.

a. solid - liquid b. liquid - gaseous

c. gaseous - liquid d. liquid - solid

18 The change of matter from a gaseous state to a liquid state is called ____ .

a. evaporation b. condensation c. freezing d. melting

19 The change of matter from a liquid state to a solid state is called ____ .

a. evaporation b. condensation c. freezing d. melting

20 When the temperature of ice increases, its particles ____ .

a. move slower b. move faster

c. number increases d. number decreases

2 Put (✓) or (✗):

1. Adding drops of food colors to a cup of water is considered a physical change. ( )
2. Chunks of milk are considered a physical change. ( )
3. Condensation and evaporation are reversible processes. ( )
4. The properties of sugar will change after dissolving it in water. ( )
5. When the temperature increases, ice melts. ( )
6. When a liquid matter gains thermal energy, its particles move faster and change into a gaseous state. ( )
7. Matter changes from one state to another by changing its temperature. ( )
8. The speed of steam particles is greater than that of ice particles. ( )
9. The formation of new substances is considered a chemical change. ( )
10. When we burn a piece of paper, a new substance is formed. ( )
11. Ocean water is a mixture because it consists of water, dissolved salts, and other materials. ( )
12. When we decrease the water temperature, it evaporates. ( )
13. Chemical change is reversible because the substance doesn't change. ( )
14. Freezing is the change of matter from a solid state to a liquid state. ( )
15. The total number of particles in the matter doesn't change by changing the state of the matter. ( )
16. The amount of matter doesn't change when it changes from one state to another. ( )
17. Water droplets are formed on a glass window because of the condensation process. ( )

3 Complete the following sentences using the words between the brackets:

1 (physical - oxygen - burning - chemical - Melting)

a. Baking bread is a .... change, while stretching copper into wires is a .... change.

b. .... of candles is a physical change, while .... of paper is a chemical change.

c. The iron rusts when it reacts with ....

2 (chemical - heat - evaporates - physical)

a. When we .... an ice cream, it melts and becomes liquid.

b. Odor and texture are from the .... properties of matter.

c. Iron rust is from the .... properties of matter.

d. Water .... when it is exposed to a high temperature.

4 Write the scientific term:

1 It is the process of removing salts from seawater.

2 It is a process by which matter is changed from a solid to a liquid state.

3 It is the process by which matter changes from a liquid state to a gaseous state.

4 They are changes in matter which are usually reversible and don't affect its structure.

5 It is a change in matter with a change in its structure producing a new substance.

6 It is the process by which matter changes from a gaseous state to a liquid state.

7 It is a temperature at which matter changes from liquid to solid.

8 It is anything that takes up space and has mass.

9 It's the formation of a flaky reddish layer of iron oxide occurs when iron reacts with oxygen.

10 It is a type of energy we get from the Sun and it's used in warming houses and cooking food.

5 Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1 Condensation	a. is the change of matter from a solid state to a liquid state.
2 Freezing	b. is the change of matter from a gaseous state to a liquid state.
3 Melting	c. is the change of water from a liquid state to a solid state.
4 Evaporation	d. is the change of water from a liquid state to a gaseous state.

1 .... 2 .... 3 .... 4 ....

6 Give reasons for:

1. Burning of paper is considered a chemical change.
2. The oil takes the shape of the container.
3. We can separate salt from water by heating it for a long time.
4. Melting and freezing are considered physical changes.
5. Ice melts when the temperature increases.
6. Fruit salad and salt water are considered mixtures.
7. The formation of a bad odor when milk is left out of the fridge for several days.
8. Air is considered a mixture.
9. Making bread is considered a chemical change.
10. The formation of a reddish color layer on the surface of a wet iron after a period of time.



What happens if:

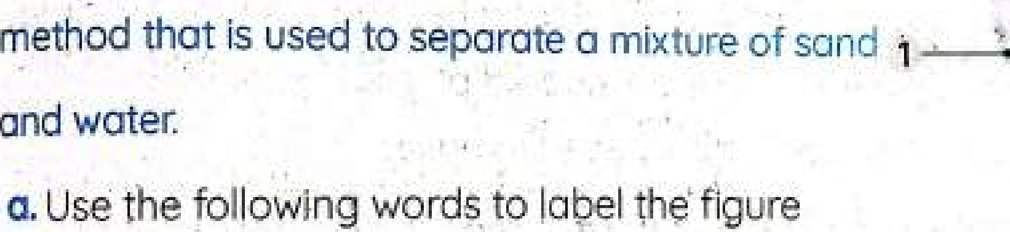
1. We leave ice out of the freezer?
2. We leave a piece of iron exposed to air for a period of time?
3. We add baking soda to vinegar?
4. We heat salt water for a long time?

8 Correct the underlined words:

1. Freezing water changes it into a liquid state.
2. Burning wood is considered a physical change.
3. A matter changes from a liquid state to a gaseous state by cooling.
4. The particles of matter move slower and become further from each other in the evaporation process.
5. Vegetable salad is considered a compound.
6. Iron is considered a solid, because it has a definite color and shape.
7. If the temperature of water increases, it melts and turns into steam.
8. When a matter is cooled, its particles move faster.

9 Answer the following questions:

1. The opposite figure represents the separation method that is used to separate a mixture of sand and water.

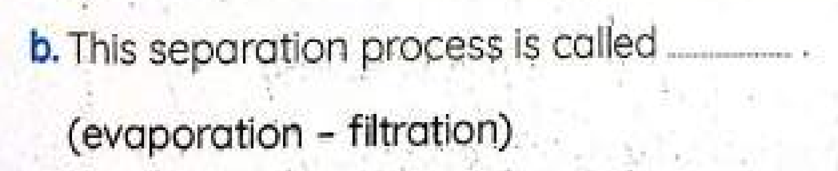


   a. Use the following words to label the figure

   (Sand – Water – Mixture of sand and water)

   b. This separation process is called ....

   (evaporation – filtration)



2. Classify the following changes into physical or chemical changes:



a.	b.	c. ....



Government Model Exams

1 Cairo – El Zaitoun District

Question (1)

(A) Choose the correct answer:

1. Any food chain ends with living organisms that are called ....
   a. producers b. decomposers c. consumers d. autotrophic
2. The .... carries sugar from the leaves to all plant parts.
   a. xylem b. flower c. fruit d. phloem
3. The .... is made up of very tiny particles.
   a. mass b. volume c. matter d. weight
4. Habitat loss causes the .... of living organisms.
   a. extinction b. growth c. constancy d. increase

(B) Classify the changes into (physical or chemical) changes:

1. Rusting of iron 2. Cutting wood

Question (2)

(A) Put (✓) or (✗):

1. The soil is not one of the basic needs of the plant. ( )
2. The length of the door can be measured by the unit of kilogram. ( )
3. Whales and sea turtles can differentiate between their food and pieces of plastics. ( )
4. Melting is the change of matter from a solid state to a liquid state. ( )

(B) What happens to:

The coral reefs when the temperature of water rises?

Question (3)

(A) Complete:

1. The sweet taste of sugar is one of its .... properties.
2. The .... is the main source for getting energy.
3. When the food chains interact with each other, they form a ....
4. Oxygen is a .... matter as it doesn't have a definite shape or volume.

(B) Give a reason for:

A farmer found seeds that are not from the seeds of his farm.

2 Giza – Experimental Directorate (1)

Question (1)

(A) Put (✓) or (✗):

1. Green plants can grow well in a dark room. ( )
2. A food chain starts with decomposers. ( )
3. Liquid particles move faster than solid particles. ( )
4. Ice is considered a solid state of matter. ( )

(B) Give a reason for:

Xylem vessels are important for the plant.
Because they transfer .... and .... from the roots to the leaves.

Question (2)

(A) Choose the correct answer:

1. To see the components of one blood cell, we need a/an ....
   a. electron microscope b. scale
   c. measuring tape d. balance
2. .... are pores on the surface of a plant's leaves that allow gases to move in and out the plant.
   a. Stomata b. Xylems c. Phloems d. Hairs
3. The suitable habitat for microorganisms to survive is ....
   a. hot water b. warm water c. cold water d. boiled water
4. An example of a gas is ....
   a. chocolate b. rock c. pencil d. oxygen

(B) Cross out the odd word:

Pine trees – Apple trees – Bacteria – Grasses

Question (3)

(A) Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1 Veins	a. are floating on water.
2 Coconut seeds	b. carry the carbon dioxide gas from the body to the heart.
3 Physical change	c. are used to build roofs of homes in cold weather.
4 Ceramic tiles	d. are changes in matter which are usually reversible and they don't affect its structure.

(B) What happens if: We put a seed of bean in a soil and water it?

3 Giza - Experimental Directorate (2)

Question (1)

(A) Choose the correct answer:

1. The green plants can make their own food through the ....
   a. roots b. leaves c. stems d. flowers
2. Wind plays an important role in dispersing .... seeds.
   a. small, light b. big, heavy c. sticky d. floating
3. When you leave a cup of water in the freezer, water will change into a .... state.
   a. solid b. liquid c. gaseous d. a and c
4. Salt can be separated by .... the salt water.
   a. melting b. evaporating c. freezing d. condensing

(B) Cross out the odd word:

Water - Sunlight - Oxygen - Carbon dioxide

Question (2)

(A) Put (✓) or (✗):

1. Phloem transports food materials downward from the leaves to other parts of the plant. ( )
2. A desert food chain does not contain any type of fish. ( )
3. A model of an airplane shows us how it flies up in the air. ( )
4. The ability of matter to burn and rust are considered from the chemical properties of matter. ( )

(B) What happens if:

All primary consumers disappear from a certain food chain?

Question (3)

(A) Complete using the words between the brackets:

(physical - Melting - leaves - chemical - Sun)

1. .... is the change of matter from a solid state to a liquid state.
2. .... is the main source of energy on Earth's surface.
3. Photosynthesis process happens in the plant's ....
4. Iron rusting is an example of .... change.

(B) What happens to: The coral reefs when the water temperature rises?

Question (1)

(A) Put (✓) or (✗):

1. The plants make their own food by photosynthesis process. ( )
2. Decomposers have an important role in the ecosystem. ( )
3. The roof of a desert home is similar to that of a rainforest home. ( )
4. Wood is a transparent material that is used in making eyeglasses. ( )

(B) Form a food chain by using the following organisms:

a. Small fish b. Bacteria c. Seabirds
d. Microorganisms floating on the surface of the sea

Question (2)

(A) Choose the correct answer:

1. A substance changes totally into a new substance by .... change.
   a. chemical b. physical c. melting d. breaking
2. The plants use the .... to produce their food.
   a. sunlight b. wind c. batteries d. moon
3. A matter consists of ....
   a. cells b. proteins c. muscles d. molecules
4. The measuring unit of mass is ....
   a. liters b. grams c. centimeters d. millimeters

(B) What are the main parts of a plant?

Question (3)

(A) Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1. The mass	a. is the amount of matter in an object.
2. Atmospheric air	b. is used to measure a certain volume of food oil.
3. Chemical change	c. is a change that occurs when mixing two substances and producing a new one.
4. Measuring container	d. is a mixture that exists in a gaseous state.

(B) Write the scientific term:

A part of plants that is responsible for reproduction.

5 Alexandria - Montazah District (1)

Question (1)

(A) Choose the correct answer:

1. Water and nutrients are transported from the roots to the leaves through the ....
   a. xylem b. phloem c. chlorophyll d. stomata
2. All the following are consumers, except ....
   a. hawks b. snakes c. grass d. rabbits
3. The suitable habitat for microorganisms to survive is .... water.
   a. hot b. boiled c. cold d. warm
4. Particles of .... vibrate around their place.
   a. iron b. air c. oxygen d. water

(B) Give a reason for: Water is liquid.

Question (2)

(A) Put (✓) or (✗):

1. Changing the shape of a material affects its mass. ( )
2. Coral bleaching happens when the temperature of seawater increases. ( )
3. A hawk can get its needed energy directly by eating beetles. ( )
4. Veins return the blood that carries carbon dioxide to the heart. ( )

(B) Write the scientific term:

It's a tool that is used to measure the length of a wall.

Question (3)

(A) Choose from column (A) what suits it in column (B):

Column (A)	Column (B)
1. Melting	a. is produced during photosynthesis process.
2. Freezing	b. is used during photosynthesis process.
3. Carbon dioxide gas	c. is a change of matter from a solid state to a liquid state.
4. Oxygen gas	d. is a change of matter from a liquid state to a solid state.
	e. is a change of matter from a liquid state to a gaseous state.

(B) Cross out the odd word: Clam - Zooplankton - Algae - Sea urchin

6 Alexandria - Montazah District (2)

Question (1)

(A) Choose the correct answer:

1. The primary source of energy for all living organisms on the Earth is the ....
   a. Sun b. green plants
   c. photosynthesis process d. sugar
2. A marine food web usually starts with ....
   a. clams b. zooplanktons c. parrotfish d. algae
3. The movement of particles of water are slower than those of ....
   a. wood b. plastic c. air d. gold
4. The volume of one liter of water has the mass of ....
   a. one gram b. one kilogram c. one millimeter d. one cm^2

(B) Write the scientific term:

They are materials that have definite volume and they take the shape of the container.

Question (2)

(A) Correct the underlined words:

1. The plant stem contains tiny holes that allow gasses to pass into the plant.
2. Xylems help plants to get water from the soil.
3. Melting means changing the matter from a liquid state to a gaseous state by heating.
4. A compound is two or more substances that can be separated easily.

(B) How can we separate salt from water?

Question (3)

(A) Complete the following:

1. .... gas is produced by the plant during photosynthesis process.
2. Burning of sugar is a .... change, while dissolving sugar in water is a .... change.
3. The thermometer is used to measure the ....
4. Most flowers have a/an .... stem.

(B) Give a reason for:

The roof of the tropical rainforest homes is made of leaves and sticks.

7 Alexandria – Eastern District (1)

Question (1)

(A) Choose the correct answer:

1. Water and nutrients move up in a plant stem through the .... tubes.
   a. stomata b. roots c. phloem d. xylem
2. The .... is the first link in any food chain.
   a. consumer b. producer c. decomposer d. food web
3. The particles are held together more loosely in the case of the .... state.
   a. solid b. liquid c. gaseous d. air
4. .... is commonly used to make electrical wires due to its properties.
   a. Glass b. Wood c. Helium d. Copper

(B) Give a reason for: Birds are secondary consumers.

Question (2)

(A) Put (✓) or (✗):

1. Blood moves only in one direction in human's veins or arteries. ( )
2. Chemical changes as rust can be reversed easily. ( )
3. Food and oxygen provide the energy that the body needs. ( )
4. When a matter has extra energy, it allows the particles to change into different states. ( )

(B) What happens to:

The eagle if the grass was removed from the area?

Question (3)

(A) Complete the following statements:

1. Trees and other plants make food through .... process.
2. You can separate the particles of a mixture of sand and water by ....
3. The .... is the reproductive parts of many plants.
4. Bacteria and worms are examples of ....

(B) What is the importance of:

Microorganisms for the marine ecosystem?

Question (1)

(A) Use the following words to complete the statements below:

(organisms - particles - 0°C - imbalance - 100°C)

1. When a drought occurs in a lake, it causes .... in the ecosystem.
2. All matter is made up of ....
3. The freezing point of water is ....
4. All .... need a source of energy.

(B) Write the scientific term: It is the final link in a food chain.

Question (2)

(A) Put (✓) or (✗):

1. Metal rusts due to chemical changes that occur to the material. ( )
2. Coral bleaching has a positive impact on coral reefs. ( )
3. Cutting wood into pieces changes its mass and density. ( )
4. A flower is the reproductive part of the plant. ( )

(B) Mention two methods of seed dispersal.

Question (3)

(A) Choose the correct answer:

1. .... is the solid state of water.
   a. Water b. Ice c. Steam d. Water vapor
2. All the following factors pollute the water, except ....
   a. plastic garbage b. animals waste
   c. sunlight d. human waste
3. The plant gets air in the photosynthesis process using its ....
   a. roots b. xylem c. phloem d. stomata
4. The measuring unit of mass is ....
   a. liters b. grams c. cm d. mL

(B) Study the opposite figure and answer:

1. This model is called ....
2. The snake is a .... that eats the mouse.

Question (1)

(A) Complete the following sentences from the words below:

(Seabirds - particles - liquid - consumers)

1. Decomposers and .... depend on producers to get their energy.
2. .... build their nests on the top of mountain cliffs.
3. A .... matter has a definite volume and it takes the shape of the container.
4. Any matter is made up of millions of tiny .... that we can't see with our eyes.

(B) Give a reason for: Soil fertility depends on decomposers.

Question (2)

(A) Put (✓) or (✗):

1. Plants can grow in a dark room. ( )
2. Phloems are tubes that carry water and nutrients from the roots to the leaves. ( )
3. Both the jellyfish and sea turtle are consumers. ( )
4. Gases don't have a definite shape or volume. ( )

(B) Mention one example of:

1. Solid state: ....
2. Liquid state: ....

Question (3)

(A) Choose the correct answer:

1. During photosynthesis process, the green leaves take .... from the air to make their own food.
   a. oxygen gas b. sunlight c. carbon dioxide gas d. water
2. All the following are producers, except ....
   a. grass b. trees c. bacteria d. algae
3. Flowers produce .... for reproduction.
   a. seeds b. stems c. leaves d. roots
4. To see the components of one blood cell, we need a/an ....
   a. measuring tape b. electron microscope c. regular microscope d. scale

(B) What happens if: You put a cup of water in the freezer?

10 Alexandria - Western Di...

Question (1)

(A) Choose the correct answer:

1. Food moves down in a plant stem through the .... tubes.
   a. stoma   b. roots   c. phloem   d. xylem
2. The .... is in the end link of any food chain.
   a. consumer   b. producer   c. decomposer   d. food web
3. The particles are held together more loosely in the case of the .... state.
   a. solid   b. liquid   c. gaseous   d. air
4. .... is commonly used to make electric wires because of its properties.
   a. Glass   b. Wood   c. Helium   d. Copper

(B) Give a reason for: Snakes are secondary consumers.

Question (2)

(A) Put (✓) or (✗):

1. Blood moves only in one direction in human's veins or arteries. ( )
2. Chemical changes, as rust, can be reversed easily. ( )
3. Food and oxygen provide the energy that the body need. ( )
4. When matter has extra energy, it allows the particles to change into different states. ( )

(B) What happens to: The eagle if the grass was removed from the area?

Question (3)

(A) Complete the following statements:

1. Trees and other plants make food through .... process.
2. You can separate the particles of .... by evaporation.
3. The flower is the .... parts of many plants.
4. Bacteria and worms are examples of ....

(B) What is the importance of:

Microorganisms for the marine ecosystem?

Question (1)

(A) Choose the correct answer:

1. The .... of the plant get water and nutrients from the soil.
   a. stems b. leaves c. flowers d. roots
2. .... carry the blood which is rich in oxygen and glucose from the heart to the body cells.
   a. Veins b. Necks c. arteries d. Lungs
3. Ice can turn into water by ....
   a. heating b. freezing c. cooling d. solidification
4. In a food chain, the energy transfers ....
   a. from a predator to prey b. from prey to a predator
   c. from a predator to a producer d. from a producer to a predator

(B) Arrange the following words to make a food chain:

Hawk – Snake – Insect – Owl – Grass – Frog

Question (2)

(A) Put (✓) or (✗):

1. Rusting of iron is a physical change. ( )
2. If the masses of two different materials are equal, their volume must be equal. ( )
3. Xylem is important for plants to transfer water from the plants roots to the leaves. ( )
4. Coral bleaching occurs when the temperature of seawater decreases. ( )

(B) What happens to: The solid matter particles if it is heated?

Question (3)

(A) Complete the flowing sentences using the words below:

(tubers – Microorganisms – seed dispersal – ecosystem)

1. Travelling by wind and floating on water is called ....
2. A desert is considered an example of a/an ....
3. The potato stem extends underground and it's called .... stem.
4. .... are the producers in the marine food web.

(B) How can you separate the salt water mixture?

Question (1)

(A) Choose the correct answer:

1. Any marine food chain doesn't induce ....
   a. algae b. zooplanktons c. tigers
2. Sharks will find .... due to coral bleaching.
   a. a big amount of food b. a small amount of food
   c. the same amount of food
3. All of these substances are liquids, except ....
   a. oil b. milk c. stone
4. Gases have .... shape.
   a. a definite b. no definite c. different

(B) Give a reason for: A book is a matter.

Question (2)

(A) Write the scientific term:

1. They are consumers that exist at the top of food chains.
2. It transfers between animals in a food web to help them do their activities and survive.
3. It's the state of water after its freezing.
4. It's the state of matter that has definite volume and shape.

(B) What happens to: The coral reefs when the water temperature rises?

Question (3)

(A) Correct the underlined words:

1. Energy transfers when a secondary consumer feeds on a producer.
2. Plastic is healthy and smooth, so it's harmful to marine living organisms.
3. Water vapor is considered an example of solid matter.
4. Matter has color and volume.

(B) Study the following food chain, then complete:

Algae ⟶ clam ⟶ sea star ⟶ shark

1. Algae are considered ....
2. .... is a primary consumer.

13 Banha Educational Governorate

Question (1)

(A) Choose the correct answer:

1. Plants and trees can make their food by .... process.
   a. reproduction b. photosynthesis c. germination d. respiration
2. Matter consists of ....
   a. cells b. proteins c. particles d. muscles
3. Plants are .... because they absorb sunlight to make their own food.
   a. producers b. consumers
   c. decomposers d. nonliving things
4. Volume is the .... occupied by an object.
   a. time b. space c. temperature d. water

(B) What happens if: Decomposers are absent from an ecosystem?

Question (2)

(A) Put (✓) or (✗):

1. Iron rusting is a chemical change. ( )
2. Coral bleaching happens when the water temperature decreases. ( )
3. A measuring tape is used to measure the lengths of objects. ( )
4. Filtration and evaporation are ways of mixtures separation. ( )

(B) Define the physical change of matter.

Question (3)

(A) Choose from column (B) what suits it in column (A):

Column (A)	Column (B)
1. Air	a. is used to measure the volume of oil.
2. Measuring cup	b. is a mixture in gaseous state.
3. Food web	c. are considered a shelter for many living organisms.
4. Coral reefs	d. is a group of several interconnected food chains.

(B) Form a food chain by using the following organisms:

Grass – mouse – hawk – snake

Question (1)

(A) Choose the correct answer:

1 Photosynthesis process takes place inside the ______.
a. roots b. stems c. leaves d. flowers

2 A food chain always starts with ______.
a. producers b. consumers c. decomposers d. predators

3 The particles are packed tightly with each other in ______.
a. water b. iron c. oxygen d. all the previous

4 The measuring unit of mass is ______.
a. liters b. grams c. cm d. mL

(B) Form a food chain using the following organisms:
a. Small fish b. Seabirds c. Bacteria
d. Microorganisms floating on the surface of the sea

Question (2)

(A) Put (✓) or (✗):

1 The transport system of plants does the same function of the circulatory system in humans. ( )
2 Habitat loss is one of the main causes of extinction. ( )
3 The roof of a desert home is similar to that of a rainforest home. ( )
4 The matter changes from one state to another by increasing or decreasing the temperature. ( )

(B) What are the main parts of a plant?

Question (3)

(A) Complete the following statements using the words below:
(Phloem - bacteria and fungi - measuring tape - melts - balance - evaporates)

1 From the examples of decomposers are ______.
2 ______ transports the glucose from the leaves to other parts of the plants.
3 When ice ______, it will change from the solid state to the liquid one.
4 We can measure the length of a classroom using a ______.

(B) Give a reason for: Coral bleaching occurs.

...Primary 5,
First Term, 2022/2023

Question (1)

(A) Choose the correct answer:

1. .... is from nonliving things of the ecosystem.
   a. Fungus b. Plant c. Soil d. Grasshopper
2. Lion is one of the ....
   a. producers b. grass-eaters c. meat-eaters d. decomposers
3. An example of matter that is attracted to magnets is ....
   a. cork b. iron c. wood d. plastic
4. The measuring unit of volume is ....
   a. cm b. grams c. cm^3 d. kg

(B) Form a food chain by using the following organisms:

a. Grass b. Rat c. Hawk d. Snake

Question (2)

(A) Put (✓) or (✗):

1. Plants make their own food by respiration. ( )
2. Decomposers don't have a role in the ecosystem. ( )
3. The atmosphere is a mixture of many gases. ( )
4. Glass is a transparent material that is used in making eyeglasses. ( )

(B) Mention two methods of: Seed dispersal.

Question (3)

(A) Complete the following statements using the words below:

(model - physical - chemical - imbalance - producers - decomposers)

1. When a drought occurs in a lake, it causes .... in the ecosystem.
2. The .... get their energy from sunlight.
3. Iron rust and burning reactions are from .... changes.
4. A .... is a copy that is similar to the real thing to show what it looks like or works like.

(B) Give a reason for: Habitat loss occurs.